NEWSLETTER No. 24

REMOTE IMAGING GROUP

MARCH 1991

REMOTE IMAGING GROUP (R. I. G.)
NEWSLETTER No. 24 MAR 1991

EDITOR
Correspondence to Chairman for time being
SECRETARY
Correspondence to Chairman for time being
CHAIRMAN Henry Neale, G3REH
Thornlea, Fishersgate, Sutton St. James,
Spalding, LINCS. PE12 0EZ
Tel: 0945 85353

MEMBERSHIP SECRETARY
All membership enqs/subs/applications
Des Watson, G3YXO,
Norton, Gote Lane, Ringmer, Near Lewes,
East Sussex. BN8 5HX.

TREASURER
Correspondence to Chairman for time being

RUSSIAN SATELLITE INFO. COORDINATION
Les Currington, G8LOK
14 Homerfield, Welwyn Garden City,
HERTS. AL8 6QZ
Tel: 0707 326058

EDUCATION & SCHOOL LIAISON
Post vacant at present
any offers to Chairman

EXHIBITIONS & RALLY COORDINATOR
Mike Coombs, G4YBB
Tel: 0530 243494

COMMITTEE: John Tellick Gordon Fleming Colin Hall
Peter Newman Ray Godden Dave Cawley

Published by The Remote Imaging Group (RIG).
Printed by Isle Print Services, Wisbech.

NEWSLETTER No. 24 Mar 1991

CONTENTS

COMMITTEE	INSIDE FRONT COVER	
COMMITTEE STATEMENT		2
CHAIRMANS WAFFLE		5
POTTED HISTORY SO FAR	Peter Wilson	11
HRPT FROM QUORUM		15
SETTING PCSAT3 LEVELS	Mike Goodall	18
HRPT, THE STORY CONTINUES	Dave Cawley	19
STORING WEATHER PICTURES ON DISK		25
AN UNEXPECTED CHRISTMAS PRESENT	James Brown	39
IT'S HENRY'S FAULT	Mike Goodall	43
CURRENT POSITION WITH THE LNA PROJECT		46
SPACETECH AND 8MEG ARCHIMEDES	Barry Haines	47
RIG ACCOUNTS		49
WEATHER PICTURES FROM THE VDU SCREEN	Les Hamilton	51
AMIGASAT HISTORY	Geoff Hatto	54
A POTTED HISTORY OF MARTELEC	Chris Pretty	56
NOISE MEASUREMENTS ON PCSAT3	Mike Goodall	57
WATCHFUL WILLIE		58
SOVIET & CHINESE SATELLITE SCENE	Les Currington	59
METEOR 2 SERIES WEATHER SATELLITES	Les Currington	61
KEPLERS	Max White	65
REFERENCE ORBITS	Simon Goodall	66
LOCKING RECEIVER	Barry Haines	68
SAT TRACK - TRACKING SYSTEM	Roland Iten	72
SATELLITE TRACKING PROGRAM	Gordon Train	76
PREDICTION PROGRAM	Les Hamilton	76
LAYMAN'S GUIDE TO SATELLITE TERMINOLOGY	James Brown	80
PROFILE OF A WX APT RECEIVING STATION	Drew McGuffie	81
EXTENDING YOUR RANGE FOR POLAR ORBITERS	John Tellick	84
DECODING METEOR 2-16	Les Hamilton	87
AUTOMATIC DAT RECORDING	Stephen Padar	89
MEMBERS LETTER'S		90
RIG HELPLINES		94
METDECODE	Bob Leggett	95
REVIEW OF METDECODE	Ken Bran	96
RIG SHOP CORNER		99
ADVERTISEMENTS		
NOAA Predictions	Bob Leggett centre	

COMMITTEE STATEMENT

Dear Member

We have decided to include this statement in the Newsletter to inform you of some recent events which you may or may not have been aware.

The reason for including it is -

1. To scotch any rumours that may be circulating that may contain inaccuracies.
2. To give you an opportunity to reflect on how you may have acted in the circumstances.

Having read our Statement you may if you feel strongly enough, one way or another, decide you want to write in and give us your views.

If you do decide to put pen to paper, please address your letter to the committee, but please post it for our convenience to the Chairman's address, which you will find in your Newsletter. When we feel a suitable time has elapsed for comment, your views will be made known to the committee. Only if we get a substantial number of the membership replying will we consider any Rule Changes, which could be introduced at Sandown next year, otherwise please treat this Statement as information to keep members appraised of committee actions.

Prior to the AGM, Phil Seaford, the group's secretary had warned the committee that for various reasons he would be relinquishing the post of Secretary, but would be happy to carry on as Newsletter Editor. At about that time, someone well known to a lot of our membership had made it known that he would like to help the group by serving on the committee.

At the committee meeting prior to the AGM, Phil handed the responsibilities over to Henry, our chairman and it was anticipated that this would only be a temporary arrangement until, following the AGM, someone else would take on the job. As you know, all committee work is done voluntarily and much depends on individual commitment.

It is at this point we started to run into difficulties within the elected committee and some differences of opinion started to emerge, which engendered a certain depth of feeling, sufficient to cause some of the committee to threaten resignation.

By now you must be wondering what this is all about. We mentioned earlier that someone well known to the group had offered to help on the committee if elected at the AGM. At the last committee meeting your chairman said there was a strong possibility that this person would be proposed and seconded for voting or otherwise onto the committee.

The problem was that the person in question is commercially involved, earning his living from the sale of remote imaging products. This split the committee three ways:-

1. Those who thought no one with commercial connections should be on RIG committee.

2. Those who thought they would bring nothing but benefits to the group.

3. Those who felt it didn't matter either way because the group rules do not allow us to debar for this, and any individual, no matter what their bias, couldn't have undue influence against the majority of views of the committee if they didn't wish it.

We have loose ties with many commercial companies, but it should not be construed from this that we endorse any particular product, or system, to the exclusion of others. For instance, when we set up our stand at rallies, the equipment there for people to see and ask questions about, has not been provided free of charge by any manufacturer. It has been paid for out of group funds, or it belongs to committee members. It is doubtful if any manufacturer would give us equipment just like that to demonstrate. If they offered, the basis of it being used would be for the sole purpose of letting members or potential members of the group see what is available in the market place and to ask questions relative to what Remote Imaging is all about.

Before we knew where we were the AGM was upon us and we hadn't resolved the problem to the satisfaction of about a third of the committee. It must be understood at this stage that the groups

rules, as they stand today (un-amended in six years since the group was formed), do not contain any clause or sub-clause in them that give us the right to exclude anyone, duly proposed and seconded, from being voted onto the committee.

At the AGM, the person offering to stand was proposed and seconded by two well respected members of RIG. They are known to quite a few people in the group, rather than just the committee. The chairman had a difficult path to steer. He knew in advance that if this person joined the committee it would mean the almost certain resignation of an unspecified number of the committee. He couldn't be certain how many, but it was a forgone conclusion, considering the strength of feeling leading up to the AGM.

An unpalatable task for any chairman to have to face - risk the resignation of an unspecified number of committee for one new member. What would you, putting yourself in the chairman's position, have done bearing in mind that the rules of the group are intended to be adhered to? As it happened, he chose to stick by the rules and hope for the best. The person was elected onto the committee.

Without going into all the AGM fine detail, during the election proceedings, Phil Seaford, Dick Boardman and Ian Gurton didn't put their names forward for re-election, the rest of the original committee stayed aboard. This was a setback, but not a disaster. Your current committee are:- Henry Neale, Les Currington, Gordon Fleming, Des Watson, Peter Newman, Ray Godden, Mike Coombs, John Tellick, Dave Cawley and Colin Hall, with possibly two others to be co-opted later.

We have held a committee meeting since the AGM and our efforts now are concentrating on some past problems and how to address them. We are aiming to give you a better service, unbiased advice, reports, reviews, value for money, hardware, software, and with a lot of effort and luck Newsletters on time. We hope you will support our efforts to serve you during this coming year.

The Committee.

CHAIRMAN'S WAFFLE

(This item was written before the AGM).

Yes there were no pictures in RIG23! Perhaps if things go well you might get a double dose in this issue! You cannot expect too many miracles? Two Newsletters dispatched in one month! Actually it all happened between Committee meetings which is even more remarkable. Mind you, having one of our committee with a fair amount of time on his hands helped. Still we caught up by the end of the year even if you didn't actually receive no. 23 until January. Enough of that, let me get on to present matters. Did I detect a new medical complaint? RIG23P39 - Imaging was restricted to --- due to holidays! Is this the first signs of APT withdrawal symptoms?

In the same letter it also alleged that RIG membership was declining ! Words fail me, (sorry Les), actually we usually finish up around 1100 by the end of the year so I don't think that we are declining, just not expanding. That might also be incorrect because Des assures me that renewals are coming in at around 10 per day. He hasn't caught up yet but apparently the return has been quicker this year. His postman has become accustomed to having a large consignment for him!

It would appear that our present overworked staff can only do so much in a year. If they had further time on their hands no doubt you would soon be seeing adverts for the YU3 mk.2 boards! Needless to say PCSAT3 seems to have overtaken events and rather mucked up the applecart! Which brings me on to another subject.

During the past months there has been several updates made to the original programme. More recently the release of Full Screen Animate has superseded previous versions. We are told that this should alleviate all the problems with the clock stopping - until you tell us different! Below is a list of the file extension details of the latest version of the individual files. If your version is not the same, then if you send me £3 for updated versions (£1 for the disks + £1 for the postage + something towards the time and energy to do it, for the group) they will soon be on the way to you (as long as you bought it from us). However in certain cases it might be better to hang onto your present versions if they work satisfactorily. You can tell if your version is up to date if the file extension details - length in bytes and the date it was made are as follows:-

BASIC PROGRAMME				
HPDUMP	EXE	17920	6-01-90	
INVERT	EXE	7392	2-01-90	
LEVEL	EXE	33664	6-18-90	
POINT	EXE	15664	7-02-90	
OKEAN				
OKEAN	EXE	21696	7-20-90	
OKEAN	OVR	15537	7-20-90	
METEOSAT				
(EARLY VERSION OF VGASAT)				
PCSAT	EXE	31376	11-24-89	for EGA only
METEOSAT				
VGASAT	EXE	31296	10-15-90	
VGASAT	OVR	33010	10-15-90	
METEOR				
VGAMETR	EXE	21712	1-11-91	
VGAMETR	OVR	15964	1-11-91	
NOAA				
VGANOAA	EXE	24992	3-19-91	
VGANOAA	OVR	41786	3-19-91	
SATSHOW				
SATSHOW	EXE	251226	2-12-91	
SETMODE	EXE	28286	2-12-91	
SHOWHELP		3917	11-19-90	
ANIMATE				
PCANIMAT	EXE	33360	9-12-90	8 bit machines only
PROANIMATE				
PROANIM	EXE	26576	10-24-90	16 bit machines upwards
PROANIM	OVR	12887	10-24-90	

FULLSCREEN ANIMATE

PCANIM	EXE	194982	2-18-91	16 bit machines upwards
ANIHELP		4704	11-05-90	

The remaining files are generated by your own machine when you input times and other settings ie. STG, NUM, TIM, PAL, PCT, DAT and PCA. I have ignored the GIF (VPIC) directory and the images that are included. I may have omitted some, so this must only be used as a guide.

Now that PCSAT3 is readily available and because of it's popularity, there have been several framestores available for sale. It is always difficult to advise people on the price to ask/offer without actually seeing the unit. Guide prices would appear to be in the region of £150 for an uncased working single page unit, without power supply. £200 for a cased working unit with power supply. £240+ for a cased 4 page working unit with power supply. Please bear in mind the quality of construction when valuing.

Have you given up Polar Orbiters because of Paging interference? Would you like to receive them interference free? If so let me have your name, address and phone number. A manufacturer has come up with a relatively pager proof rx and would like some of you to test it for them before it goes into larger scale production. It will not be excessively expensive (built +/- about £120 depending on how many extra facilities you require.) In kit form it could be as little as £70 depending on how popular it turns out to be. They are looking for members with very bad cases of interference to test a unit for them. It has already been tested by parking adjacent to a paging site and receiving interference free pictures from the NOAA's!

After having endured many comments from my wife for several months about the state of some of my clothes, I thought it was about time I did something about them. The better half and I went to the local shopping centre to get yours truly a sports jacket, a pair of trousers and a couple of shirts. Nothing unusual about that you might think. The first shop we went into we had to ask where these items were as we couldn't find them. When we did find them, we were not over impressed with the choice available and decided to go to other shops. Marks and Sparks, C & A, Littlewoods, gone for a Burton, and several others, they just didn't have Henry's size or if they did, it was in a Lucozade colour. It's enough to make this exercise into an biennial event or even less often!

Comments like, where is the male version of Evans's? or perhaps Mothercare might have some, really don't help in these trying moments. It was as if I was a weird size - I'm 46M Jacket and 44S trousers. The irony is we finished up purchasing everything from the first shop anyway which happened to be the local version of the Coop and the better half soon trotted out her divi number to claim a small share of Henry's hard earned cash for herself! There must be a moral in there somewhere, but the female mind works in a completely different way to mine and I can find no answer!

During the Kuwait crisis, I used Pcanimate on the D3 mid bottom section from 7am till after 10-30pm. It proved to be very interesting, but because my antiquated machine has only 640K available I could only get 8 frames in the animation sequence. Every few hours I had a look at it to see which way the clouds were going. During this period I did use the word processor on two occasions, but never missed an image. Nothing went wrong and it all worked as specified. However just before 11pm when frame 45 had been added I decided that I and the machine had had enough and closed the machine down for the night. I then went downstairs and looked at Eurosport and was shocked to see the weather flashing before my very eyes, just like my own system had been doing for the last 15 hours! I had wasted my machines life on something I could see on the box! If only they repeated the sequence a few more times more could be extracted from it. One thing is certain, the framestore cannot have its hard drive wear out so any thoughts of selling it have been filed, for the moment anyway.

Another problem with using a computer for weather satellites is the mass of data that is accumulated with all the various images. They all take up space and if they are not required they must be erased from the hard disk otherwise you soon suffer from hard disk constipation! An information overload, a form of stress to the computer. Perhaps computers are getting more human-like as they develop more sophisticated skills. They will probably need an analysts, no a psycho-analysts when they suffer stress. This one seems to have a mind of its own sometimes and will only do what it wants to without severe domination. They also catch viruses so they are catching us up! At least I can switch the power off even if they do have a battery backed up clock.

Full images take up 512k and you don't need many to take up all those precious spare bytes. It's probably wise to erase all the images after a session unless they are particularly good or important. It would be better to save them to floppy disk for future reference. It might be useful to save a test card for test purposes as well, because there are all the important things on it. Measuring the noise content is not easy and is covered in an article elsewhere. My own system currently gives me about 5/256 noise or 2% and is difficult to improve on.

My quad loop yagi (now very battered and bent) is fixed just below my shack window and produces a signal that is at least 3db less than when it is used on rallies. It is line of sight but this line runs near (4 feet) from a very large weeping willow tree. This reduces the signal received and there is no easy alternative. I've tried to prune a few of the close branches but I still haven't improved things much. It must be a low signal location. At least it gives me the incentive to improve the system. With only 2% noise the meteosat sensors give me more so perhaps there isn't any good reason to improve. By the way can any of you resolve the highest vertical definition bars properly on the Meteosat test card? I cannot resolve them. Perhaps that bit is just not transmitted. Any comments?

Progress on the LNA kits has ground to a standstill unfortunately. The latest modification of using a HEMT in the first stage is the current line of thought. It reduces the noise figure to about 2/3 of the GASFET figure and the HEMT price is not much more than the original component. However certain other constructional changes are envisaged, but time and component availability have delayed us still further. I can say that the 50 ohm modification included in RIG23 is well worth doing. Needless to say that whilst conducting these tests yet another one bit the dust! There are further details of the progress of the LNA kits elsewhere in this Newsletter.

Because directory enquiries now cost money, could you please include your telephone number, if you have one, in any letters, so that we can contact you if we need to? It is sometimes much easier to talk to you than write, but it is obviously more expensive. Des Watson also tells me that he still has several members who insist on not having their names and addresses on his computer. That is your prerogative, but may I ask you to consider your decision carefully. If we get too many doing this we will have to reconsider what to do in this respect. We don't want to loose you but it does

make Des's work just that much more difficult. The data contained on his computer is treated very carefully and I don't think that we have ever had a complaint about our use of it. It is however given to the authorities occasionally for the registration of your authority to carry on receiving weather pictures. It will never be given to any commercial interest for mailing shots or similar - it is purely for our own use - mainly printing the mailing address labels - it does make those mammoth tasks that much easier.

Another item on your renewal forms is the No Publicity box, if this is left blank, Des has to put you down for No Publicity, just in case. Several members say to us when we point out that they are down for No Publicity that they didn't know that they were. Please next year make sure that if you want to remain "Private" the box is marked correctly and not just missed. We have no objections to this and this is your prerogative, in the meantime we have to use our discretion.

Since Christmas I have been intending to get a small bit of the floor cleared up in my shack so that I, or anyone else, can just stand in the doorway. Not an enormous job you might think! Some of you might have seen the problem and will know exactly how big the job is! Just clearing part of the doorway resulted in an A4 size pile 2 feet high and I still couldn't get the door closed! If and when I get anywhere near completing the job that heap of papers will be approaching a cubic metre in size. I trust there isn't a SAE of yours in there somewhere!

One success story is that we now have available from stock Binders that will hold approximately 12 Newsletters with the RIG Logo on the spine. Further details will be found elsewhere. Well that about wraps it up for another one. In the meantime take care and we will try and get the June edition out nearer June.
Best Wishes Henry

(After the AGM and after you have read the Committee Statement)

I'm sure we shall miss Phil, Dick and Ian. Their services in the past have been more than I could have wished for. I'm sorry that they feel that they do not wish to serve on the present committee. I, and the rest of the Membership can only wish them the best for the future and our gratitude for the past. They will be missed!
Henry

POTTED HISTORY SO FAR

Peter Wilson, G8KEK

The following short article is to give anyone who has yet to receive their own 'Pictures from space' an insight into how easy it can be if you take things step by step.

My own interest in radio stems back many years, and I became licensed in 1974. In those days FM was very rarely heard and I used an old ex-taxi Pye radio converted for two metres (AM) as the transmitter.The receive set-up consisted of a home made converter and a Lafayette HA500 communications receiver.

Having spent many months talking to the locals, I got bored with two metres and started to look around for other interests. It was at this time that I saw an article in Wireless World describing how to decode NOAA pictures using an oscilloscope and long exposures on a normal camera. I proceeded to convert yet another ex-taxi radio to receive 137.62 MHz, and used the communications receiver as a tunable I.F. At this time I had no idea about orbital predictions and the like. All I wanted to do was to hear the signals. I can remember spending many hours wondering if my set-up was working correctly as nothing was heard. One evening the unmistakable clip-chop sound of a weather satellite came through the noise. I had heard my first remote imaging signal!

It was many years before I was able to take up the interest again, (moving house and bringing up two young daughters). In 1986 Maplin published the design for a receiver and decoder for weather satellites. As I am more of a "user" than a "designer", this seemed a quick way to start. I bought both receiver and decoder and had them built in no time at all, the Maplin kits are very well documented. This set-up relies on the BBC computer for displaying the pictures and although everything worked first time, the results were disappointing and nothing like those I had seen published in various articles. However, it did enable me to learn about orbit predictions, and the different sounds of American and Russian satellites. I used this set-up for a few months but wanted better resolution.

Later that year I attended our local carnival and noticed a Meteosat picture being displayed on a computer. The local radio club had put on a small display to try and boost the membership. The lucky thing for me was that two members of the RIG committee live in my home town and were members of the radio club.

So I went to the next few meetings and learnt about the existence of RIG and the YU3 framestore. At this point, those of you who are just about to start building the framestore, read on and take note !!

I bought the components for the framestore through RIG and on receipt spent quite a while making sure that all the components were there. Good thing I did as a number of the IC's were missing. Remember what I said earlier I am a user not a designer so I have to be very careful when taking on projects of this type. The PCB's were double sided but the holes were not plated through, this means that connection has to be made at the time of assembly. My solution was to use high quality IC sockets with turned pins, these are sturdy enough to allow a soldering iron to be used on both the top and bottom sides of the PCB. This point alone saved me hours of frustration. I am sure as the rest of the job was fairly easy. Keep reading the documentation every step of the way, and check and double check. I took advise from Ian Gurton who had built the framestore some time before, and used a case supplied from RS components (Ian also had a spare front panel)!! I made sure there was plenty of room for access in case I needed to repair things at a later stage. Having spent about one week assembling my new framestore it was time for switch-on. The amazing thing was that it worked first time. Other than a few minor adjustments I had a method of receiving high resolution weather pictures.

I was still using the Maplin receiver at this stage, which is tuned manually and I wanted to be able to scan all possible frequencies in case I was missing other satellites. I decided to purchase the RIG scanning receiver, which by this time had the new narrower filters to reduce interference from pagers. This is an excellent receiver and I would recommend it to anyone. This equipment has been in use for the last four years with superb results.

During this period I became familiar with other types of satellite by reading the many articles in RIG. I also started to read about the various types of software available on the PC. I had an Amiga and James Brown had sent me a number of pictures decoded on this computer. However it seemed to me that I would need to move to a PC if I was to receive some of the stunning pictures I had seen at rallies. I also wanted to receive animated pictures from Meteosat and again there was more software available for the PC. So I started to look out for a software package for the PC and at the same time a method of getting onto Meteosat.

It was at this time that I had the pleasure of meeting Les Currington who is the RIG Guru on Russian satellites. Les started me off on Meteosat, and in the process showed me the Timestep PC software for all current satellites. This package convinced me that moving to a PC was the right move for me. It offers decoding of Russian satellites without the need for a separate synchronising signal from a stereo tape recorder. I bought a second-hand IBM PC-AT and a Meteosat down-converter in preparation for my transition to animated high resolution colour pictures!

I bought the PCSAT software from Timestep and in a very short space of time started receiving polar orbiters on my existing set-up. The results a very good, but bear in mind I only obtained this equipment in November 1990, so the visible light pictures wont be any good until April/May. The nice thing about using the PC is the ability to zoom into any part of the picture without losing the resolution. It also allows for contrast stretching and the addition of colour at a later stage. Together with the animation facility these packages really do bring a new dimension to our hobby.

Now for the most frustrating aspect of this recent acquisition - getting the Meteosat set-up working. I bought a second-hand dish which I believe is know as a "Petal" dish. This was installed in a clear spot at the end of the garden close to a garden shed in which the down-converter is housed. The low frequency signal (137.5 MHz) is fed to the house from the shed to my RIG receiver. The dish was aligned by moving it to obtain the best possible signal, and then locked firmly into position. Unfortunately I don't seem to able to get consistently good signals. One day they are noise free, the next they are hardly discernible. The point here is that lead lengths have to be kept to a minimum, solder joints have to be good and no "twisted bits of copper wire" for joints as I had at one time.

At the time of writing the Meteosat problem has yet to be resolved, as it will. My message to those people setting out on a similar path is to take things at a steady pace. Don't try and take on too much. For instance, unless you are an experienced microwave engineer, I would not advise starting out on the Meteosat route until you have the Polar orbiters well and truly under your belt. It is a great hobby and there are lots of things to learn on the way.

INTERFERENCE TOMORROW ?

It has come to my attention that there are proposals around to use the 1700mHz Meteorological Band for Ground to Air Cellular Base Stations using omni directional aerials. The proposals are to allocate between 1700 - 1701mHz, 1704 - 1705.5mHz and 1708.5 - 1710mHz for this purpose. You all know what happened when frequencies close to the 137mHz band were allocated to the Personal Paging systems. At these L Band frequencies it is now normal to use GASFET or HEMT type techniques in the RF stages and goodness only knows what the band will be like if and when they get established. These transmitters will no doubt have high Effective Radiated Powers and create havoc with someone down the road trying to take Meteosat or High Resolution Picture Transmissions. The person responsible for this allocation is - Mr Antony Baker, Department of Trade and Industry, Room 513, Waterloo Bridge House, Waterloo Road, LONDON. SE1 8UA. I don't know if the people that inhabit these Houses of Authority will listen to members of the public, but they might do especially if there is an Election!

HRPT FROM QUORUM

This is an informative item for those who are interested in HRPT products and gives the availability status of these items. Quorum has signed an agreement with John DuBois and Ed Marashi to supply the bit-sync cards that they have designed for HRPT reception. Let us bring you up to date on the status of the various components needed to assemble an HRPT station

Bit sync card

We have received the latest artwork from John DuBois which contains modifications to improve operations of the bit sync card. Quorum is making a few changes to the PC board artwork to improve the interface to our PSK demodulator card. We are adding a pair of female BNC connectors which will exit out through the rear mounting bracket. One BNC will connect to the baseband data output from the demodulator card. The other connector can be used to observe the received eye pattern on a oscilloscope. There will be a 3 db pad placed on the board between the two BNC connectors to terminate the eye pattern monitor jack if it is not used. The price of the bit sync card and initial software will be $400.00. Bit sync cards will be available in early December.

PSK Demodulator

The demodulator we will be offering was tested by John and Ed a few months ago. It consists of both secondary conversions and PSK demodulator combined together. Combining these, eliminates the need for additional modules. The demodulator is on a second IBM format card. Channel selection is synthesised in 50 KHz steps and controlled by the PC software. In addition, signal acquisition and strength are read on the bus and displayed on the PC screen. The demodulator card has a number of advanced features. The IF frequency is 45MHz and uses a SAW filter. The SAW filter has a 3 db bandwidth of 3.2 MHz combined with a linear phase response. The local oscillator, which mixes the input group of frequencies to 45 MHz, uses high side injection. This removes the potential for mixer spurious responses from falling in the receive passband. The higher IF frequency also improves the image rejection of the second IF. The demodulator card has provision to look at the receiver IF on a spectrum analyser by a buffered 50 ohm test point on top of the card. The test point is a female SMB connector which can be routed out of the PC if desired. The test point is 25 db below the signal in the IF and is self terminating.

The signal strength circuit uses a synchronous detector derived from the 45 MHz PLL local oscillator and the incoming IF signal. This provides a positive lock indication on the incoming signal, and provides a high dynamic range signal level output. A buffered analogue signal level DC voltage is available on the demodulator 9 pin D connector. The signal level is also converted to an 8 bit value and can be read via the host PC bus if desired. A dual comparator also provides an RF lock indication and a second signal threshold output for use by the host PC.

This card is well shielded and has two BNC connectors which exit out of the back bracket. The top BNC connector will connect to HRPT block downconverter and the second BNC will have buffered analogue baseband data for driving the bit sync card. This signal can drive a 50 ohm coaxial cable to about 4 volts PK-PK. A 9 pin D connector provides an RF indication, analogue signal and digital data out. A DC input is provided to supply 12 V DC to the downconverter up the IF cable. Power to the down converter will not be drawn from the PC. The downconverter power input is fused using a picofuse on the card. The demodulator is expected to be available in mid December and will sell for $499.00

SDC 1700B Block Downconverter

The HRPT block downconverters are available and are usually in stock. The downconverter converts an input block from 1692 MHz to 1710 MHz down to an IF output between 127 MHz and 145MHz. The local oscillator frequency is 1565 MHz and is oven stabilised. The downconverter typically has a 1 db noise figure, with 33 db conversion gain. The SDC 1700 B, like the SDC 1691 GOES downconverter, is assembled inside a milled out aluminium case with a clear iridite finish. It is available with a optional weatherproof case. The unit requires +12 V DC at 250 ma, but will draw more when first powered up until the crystal has reached 75°C

Feed 1700-C

The 1700 -C feed is used with a 4 to 6 foot parabolic dish antenna for reception of HRPT downlink signals. This feed when used with an external quadrature combiner network, will provide either right hand or left hand circular polarisations depending on the connections to the hybrid combiner. The unit has dual tapered probes mounted at 90 degree angle. The use of tapered probes for matching eliminates the need for additional matching screws in the feed assembly, which can affect port to port isolation. The feed and supporting ring are all aluminium construction and has a gold iridite finish to prevent corrosion. A universal mounting plate will accommodate most types of feed support systems. The units are supplied with stainless steel mounting hardware. The hybrid combiner is not supplied, but is available from Mini Circuit Labs or from Quorum.

Rotators

At present we do not sell rotators, but have found a source of heavy duty az-el rotators that appear to be capable of supporting a reasonable sized dish. We are in the process of applying for dealership to sell these units.

Software

The initial software will support capture of one or more image channels in 8 bit resolution. It will also allow you to view stored images. Not very much image processing will be available in the initial release, it's mainly intended to get you stated. A higher level of software functionality will be available on a regular basis.

Quorum's Test Set Up.

We have installed a 4 foot dish to do our initial testing on HRPT products. The dish is mounted on a G5400 rotator to give us az-el control. We are using a 1700-C feed which is connected to a Mini-Circuits ZAPDQ-2 quadrature power splitter using short pieces of 141 semi-rigid coax with type N connectors. The output of the combiner network goes directly into a stock SDC 1700B HRPT block downconverter which has a noise figure of 1.08 db. The IF output is run through about 100 feet of RG-58/U coax to the demodulator card. The downconverter is powered up the IF cable.

As soon as we have a clear line of sight to the satellite the demodulator acquires phase lock. The baseband eye pattern is almost fully open during most of the satellite pass. The pictures have been very impressive, especially the visible images with a good sun angle. The images are displayed in 64 grey shades and show much ground detail. I will try and send out some demo images very shortly, and also place some on the bulletin board in GIF format.

Our BBS number is (871) 421-0228.

SETTING PCSATIII LEVEL CONTROLS

Mike Goodall, G0MGI

To obtain the very best pictures on Meteosat, Noaa, etc. it is essential to set the level pots on the rear of the PC card as accurately as possible. Levels from Meteosat and Noaa will undoubtedly be different and should be put on different channels. If they are set to limit black or white levels a lot of available picture information will be lost. If black levels limit there will be little or no information seen in the sea areas, and if white limits the high white clouds will appear washed out, with no detail in them. The simple answer is to use the "POINT" program supplied with the Timestep software. This may have to be done over several pictures to get the levels set just right, but is well worth the effort.

Meteosat should be set to the high 240's for white, and the low numbers 3,4,5 for black. The TEST page is ideal for this purpose. Noaa should be set to similar levels, but on the other input channel. The grey level test bars at the side of the picture are ideal. Individual systems will obviously vary, but avoid any 255's or 0's, if possible, as too many of these will indicate limiting. The actual pictures, once saved can be manipulated by the VGASAT or SATSHOW palettes to bring out detail in the low or high levels, but any information in pictures that have limiting on black or white cannot be reclaimed, of course.

HRPT THE STORY CONTINUES
Dave Cawley TIMESTEP

This article describes the continuing progress of our HRPT system. Lot's of questions were asked about the previous article, so this is a more detailed description. Readers will know that we have a strong commercial interest but this information is useful to anyone.

Before going any further, people have asked how we are going so quickly. Well, we have had help, and must thank Mike Christianson, Bob Sansoni and John DuBois, all of whom invited me into their homes to share their knowledge and experiences. Without all three it would have been very, very difficult !

Basically their are five areas to consider for amateur HRPT :-
1) Antenna system, 2) Pre-amp, 3) Receiver, 4) Data card, 5) Software. These will be discussed below.

Antenna System.
After extensive tests we have concluded that a system capable of receiving NOISE FREE Meteosat is sufficient for HRPT. What does this mean ? Well noise free really means noise free, absolutely no spots in the sky and almost no noise at all in infrared land masses. The larger the antenna system the MORE DIFFICULT it is to acquire signals due to the increased directionality. The optimum size dish is 1.2M but 1M or even 0.9M is sufficient if matched with a low noise pre-amp.

It must be emphasised that simple systems are not capable of receiving directly overhead on overhead passes. Luckily directly overhead passes do not occur very often ! We have discussed the problem with John DuBois and Mike Christianson and they both agree that it is the speed of the satellite and the polarisation shift experienced directly overhead that cause the problems. The Bradford / Mike Sansoni system has continuously variable polarity which eliminates this effect. In practice though 9 out of 10 passes are perfect.

In our experience of simple systems, it is not desirable to try for circular polarisation. In fact with the loss of the combiner and the fact that the satellite is seldom actually circular, it seems beneficial to use just horizontal polarity, the same as Meteosat.

OK, so what about a single YAGI ? Impossible and a waste of time people said. Well, it all depends. Using a complete Timestep system it is possible. The results are marginal, it does prove a point though. Good signals can be received from 20 degrees above the horizon. The big problem with Yagi antenna systems is the stored inertia when the antenna stops moving. Put simply when you stop moving the antenna, it keeps going, and then comes back like a spring ! Trying to work out whether it is the antenna bouncing or the satellite moving is interesting. So although a single yagi demonstrates how easy HRPT is, it is recommend that a 1.2M dish is used instead.

To move the antenna go to the next Rally and buy a Yaesu 5400 Oscar Satellite rotator unit. Mount a 1M or 1.2M dish on it and fit a standard Meteosat feed. Set it up and check that you can receive Meteosat when pointing at it with a Meteosat receiver.

Do not be persuaded to use a computer tracking system to move the dish. The accuracy of the rotator pots is about 2 degrees, a computer will have an 8 bit A-D giving up to 1.5 degrees of error, satellite elements can be 2 degrees out, giving a total error of 5.5 degrees. This is too much !

Run Instant Track or any other tracking program well before the desired pass. Find the azimuth when the satellite will be 10 degrees above the horizon. Set the dish to this position. Wait until the allotted time. Peak the dish manually for maximum signal strength. Now, the satellite leisurely travels from horizon to horizon in about 720 seconds, long enough ? Unless you are very unlucky the pass will be from South to North and go up to about 50 degrees elevation and then back down.

About every 15 seconds peak the antenna for maximum strength. The signal will of course dip when you are doing this, but when you see it dipping, move it in the opposite direction. After a while you can get it just past the peak, so that the satellite will come into the peak of the antenna and then drop down, re-peak it and go just past. The satellite will again come into the peak and drop down again. Continue this for the whole pass.

Now if you try this with a single yagi with only 1dB to spare, you can see the problem. You have to keep the antenna constantly perfectly peaked, virtually impossible but a great party trick if you can do it ! In reality you will not want a whole pass anyway. It is possible to get half a pass, drink a cup of coffee and have a telephone conversation all at the same time (just).

Pre-amp.

There is a lot of controversy at the moment concerning the actual performance of various pre-amps. Hewlett Packard the makers of the definitive noise figure test set, identify the problem as the change in impedance of the noise source when switched off, and the consequent affect this has on the GaAs FET. We have measured several pre-amps and have different readings. Basically this is the subject of a complete article. However the rule above applies. If the system produces NOISE FREE images from Meteosat it is OK. The single yagi system referred to is running on a 1.7dB (real figure, not imaginary) noise figure pre-amp.

Receivers.

It is possible to modify an existing Meteosat down convertor to receive HRPT. It must have about 3Mhz IF bandwidth. The signal must then be amplified and fed into a phase demodulator. HRPT has a data rate of 665.5 Kb at +/- 67.5 degrees, implying a system bandwidth of about 3MHZ total at -3dB. The recovered data then needs to be compared or sliced into TTL format.

With a spectrum analyser at your elbow this is quite possible. Without one it is possible with a lot of effort. The main problem is that in such a large bandwidth you will find spurious signals from the oscillator chain. Mike Christianson in his early Wireless World article had to resort to traps to remove the LO frequency. Be warned !

Theoretically a quadrature discriminator will recover phase modulation, they will on the bench anyway. What is needed though, is a low threshold receiver, one that turns a small signal to noise into perfect data. We use a mini-circuits phase comparator and Mike Christianson uses a 1496 balanced mixer to achieve exactly the same results. The author would be very interested in a "chip" demodulator such as a quadrature discriminator or integral PLL design if it works. Get your soldering iron out now !
NOAA 9 and 11 transmit on 1707MHz and NOAA 10 on 1698MHz.

The Timestep receiver has six channel capability (5 fitted) with a "S" meter and RF gain control to accommodate any pre-amp. We use a real moving coil S meter with deliberately reduced range to give very accurate information to less than 1/4 dB of signal strength. This enables very accurate tracking. The receiver just needs a pre-amp and antenna and gives TTL data out. Experimenters are encouraged to develop their own low cost solutions. Timestep will help with detailed information if required.

Data card.

Here there is little choice. John Dubois and Ed Murashie have designed probably the ultimate solution and Timestep have the sole rights to this design in KIT form for constructors. It has been completely redesigned by Timestep and runs on any 286 PC or higher and takes TTL data in. It stores up to 5 channels directly to your hard disk via super fast DMA transfer. Only the speed of your hard disk determines how much data you can store up to a limit of about 60Mb per pass.

This kit is supplied "pre-assembled". All the hard work is done including a bare board test. Basically all you have to do is to fit the chips into the sockets ! The card will store all 5 bands of image data and all calibration data etc. It is completely digital and has two adjustments that can be set with no signal and a frequency counter.

Software.

The software supplied with our card is completely professional and finished. Extensive use is made of mouse driven pull down windows. Nearly all graphic cards are supported right up to 1024 pixels, 768 lines and 256 colours. The zoom mode is particularly impressive and shows images at greater than pixel level. Histogram equalisation as well as variable contrast is incorporated to bring the very best detail out of any image.

Any number of colour palettes or contrast stretches can be save and recalled by your mouse. Images can be saved in PCSAT III format or in 1024 x 768 x 256 for exchange to GIF format. Any number of bands can be saved. To store all 5 bands a fast (18mS) drive must be used and the resulting data file can be over 50MB !. For ordinary use a single band will be OK on most 40mS hard drives.

If a single band of the middle of the pass is taken a more sensible 8MB file is produced, this can be saved to GIF or PCSAT III and then deleted. Most 286\386\486 computers with a spare 16 bit slot and VGA can be used.

Results.

Seeing is believing. Unlike NOAA APT there are 5 sensors on NOAA 9 and 11. These are described below :-

Channel	Wavelength um	Usage
1	0.58 - 0.68	General purpose visible for cloud and surface mapping. Biased towards green/yellow and gives very good land detail in the summer.
2	0.725 - 1.10	Surface water delineation. Biased from red to near infrared. A good general purpose visible sensor that gives surprisingly good land detail even in winter.
3	3.55 - 3.93	Sea surface temperature and nighttime cloud mapping. Can give extremely accurate temperature readings over a relatively narrow range (-15 to +30 deg C.)
4	10.5 - 11.5	Sea surface mapping and day/night cloud mapping. A good infrared channel for general use. Rivers are visible in winter due to their temperature difference.
5	11.50 - 12.5	Sea surface mapping. Very similar to band 4.

Even in the middle of winter we can see the Thames, London, Birmingham, Manchester and rivers in the West Country from band 4.

Now that summer has almost arrived we can see small towns and reservoirs. Hills and mountain ranges are clearly visible.

OK so this may seem a hype, remember the signal is digital, it doesn't "fall apart" when the image is processed in the same way analogue signals do. The signal is either absolutely perfect or not there at all. For further information a licensed re-print of the original John DuBois, Ed Marashi JEASUG article, is available from Timestep free of charge, address on the back cover.

The future.

It is hoped that RIG will take up this exciting new development in the same way as PCSAT III. If you want RIG to handle it at advantageous prices give Henry Neale a call. He could have systems available from the end of April if the demand is there. Over to you !!

Dave Cawley, Managing Director, Timestep Electronics Ltd
Timestep 19 April 1991

STORING WEATHER PICTURES ON DISK

Marciano Righini I4MY
Guido Emiliani I4GU
Claudio Pagnani

As the signal from weather spacecraft consists of a continuous flow of data, it is necessary to enable it to be written to the disk at a greater rate than received. This article describes a weather satellite receiving station combined with a dedicated interface which forms the data into blocks and feeds them to the PC in bursts, It also turns the bursts from the PC into a continuous output data stream.

The easy way of sorting analogue picture data is recording it on audio tape. However, even high-end analogue recorders and tapes often yield poor quality images with severe streaking and some misalignment. Digital recording on a computer disk implies extensive use of hardware, but provides reliable, high-grade pictures along with interactive image processing capability. The more demanding piece of hardware of the system is the memory buffer unit which, however, is a general purpose device and can be used to solve a large number of data acquisition problems. For instance, it might be used to store high speed, high resolution digital data from Meteosat, GOES, and the NOAA spacecraft.

Our aim is to give suggestions on how an earth bound APT receiving station might be built with an eye to future development mostly related to the display of digital HRPT data.

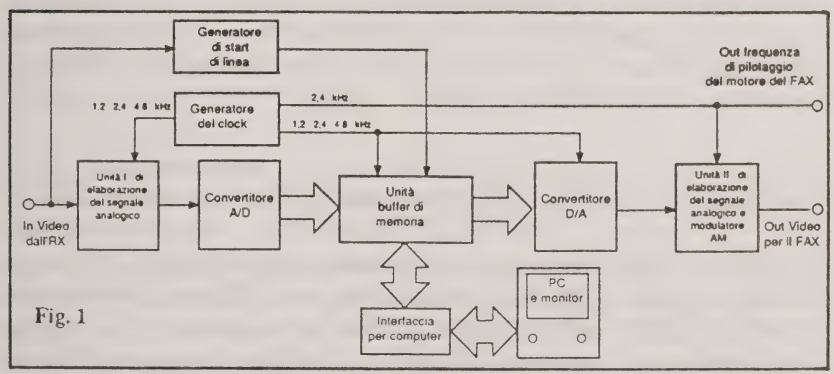

Generatore di start di linea
Out frequenza di pilotaggio del motore del FAX
1.2 2.4 4.8 kHz
Generatore del clock
2.4 kHz
1.2 2.4 4.8 kHz
In Video dall'RX
Unità I di elaborazione del segnale analogico
Convertitore A/D
Unità buffer di memoria
Convertitore D/A
Unità II di elaborazione del segnale analogico e modulatore AM
Out Video per il FAX
PC e monitor
Interfaccia per computer

Fig. 1

System description

Fig 1

The 2.4 kHz AM modulated data enters both the Analogue Signal Processing Unit I and the Line Start Generator simultaneously. The incoming 2.4 kHz subcarrier is demodulated in the processing unit; the video is then filtered and amplitude adjusted. The Unit also provides the pixel clock for the A/D Converter.

The processed analogue video is sent to the A/D converter which digitises it into 8-bit words at a rate determined by either the subcarrier frequency or internal clock. The local clock signal is a must to display the pictures of the USSR Meteors whose subcarrier is not exactly 2.4 KHz or the HF band pictures and weather charts which have no subcarrier at all.

The digitised video is sent in parallel word format to the Memory Buffer Unit which is the heart of the system. It forms the data into blocks and feeds them to the computer main memory in bursts, thus creating intervals during which the computer downloads the blocks from RAM to hard disk. Conversely, computer RAM can up be loaded with data coming from the hard disk. Then the data is formed into blocks by the computer and sent in bursts to the Memory Buffer Unit which turns them into a continuous stream that is routed to the D/A converter.

The analogue video is fed into the Analogue Signal Processing Unit II and AM modulator where it is filtered, amplified and chopped to modulate a 2.4 kHz signal provided by the Clock Generator. The AM remodulated signal is filtered and sent to the Fax Unit in order to get hard copies of the pictures. A bonus of the system is that one can display and print either plain or processed images, thus enhancing useful details.

The Line Start Generator provides a line start reference pulse which is essential to align the image with the edge of the monitor CRT.

The Clock Generator is crystal controlled and provides 1.2, 2.4 and 4.8 kHz square waves. The desired frequency is chosen by means of a front panel switch and fed into: a) the Analogue Signal Processing Unit I to provide a proper sampling frequency to the Meteors or the HF band pictures and weather chart, b) the Memory Buffer Unit and D/A converter to establish the pixel number per line in the hard copy printing mode.

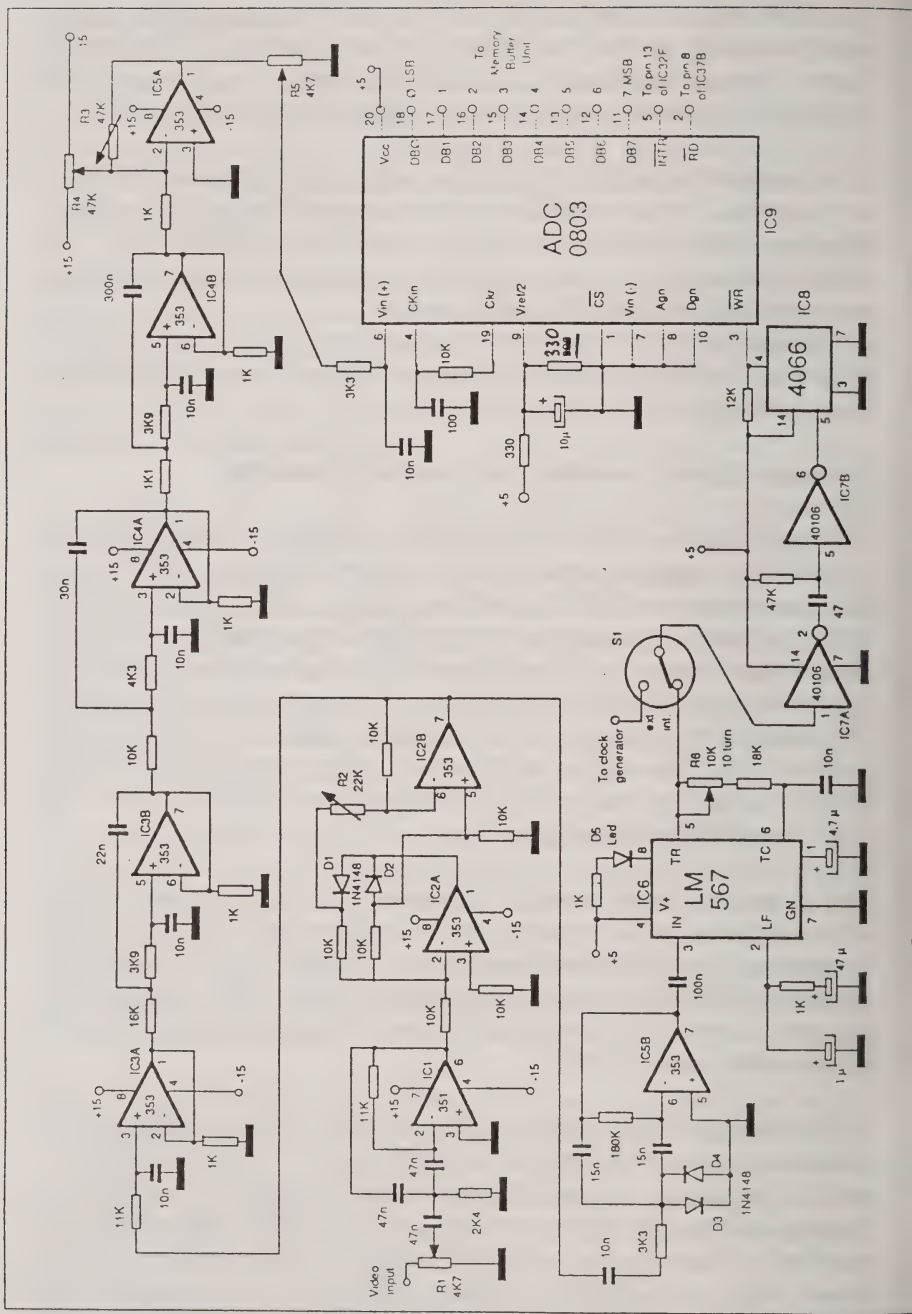
A 2.4 kHz signal is fed into the AM Modulator and is provided as a drive frequency for the Fax motor. Our Fax machine is a Muirhead-Jarvis Picture Receiver, Type D-356-B, with a 1020 Hz phonic motor; thus we have to downconvert 2400 Hz to 1020 Hz.

The computer is an IBM PC AT clone with a 70 Mbyte hard disk and a 512-kbyte, 256-colour VGA graphics adapter. We had to build an interface board between computer and Memory Buffer Unit. The circuit was wired on a plug in card which was installed in one of the expansion slots of the PC system board.
A 15 minute pass of NOAA or Meteor generates a file over 40 Mbytes. A frame of GOES or Meteosat generates a file a bit less than 1 Mbyte.

Analogue Signal Processing Unit I and A/D Converter.
Fig 2
The modulated video is fed into a 600- Hz high pass filter (IC1) to reduce low frequency interference. Next the signal is rectified by a full wave detector (IC2A-B) used as a demodulator. R2 should be adjusted until both peaks of the detected sine wave are of equal amplitude. The output of amplifier IC2B is applied to a 1400-Hz, 7-pole low pass filter (IC3, IC4) the one suggested by NOAA for TIROS-N. The resulting dc envelope is applied to IC5A which inverts the signal and adjusts it to be variable from 0 to 5 volts. R3 and R5 determine the gain, R4 provides offset current to alter the black level of the incoming signal.

The video is sent to the A/D Converter (IC9) which provides 8-bit words at a rate determined by the frequency set by either a clock synthesised from the satellite subcarrier (2400 Hz), or a local clock generator. The ADC is calibrated so that a 0 to +5 volt range yields a binary output from 0 to 255. The ADC also provides an end of conversion pulse at pin 5.

IC5B through IC8 synthesise the pixel clock from the 2400 Hz satellite subcarrier. The full wave rectified 4800 Hz signal from pin 7 of IC2B is limited by two diodes, then it is applied to a 4800 Hz bandpass filter (IC5B) which drives a PLL (IC6). With no signal applied, R6 should be adjusted in order to get 4800 Hz square waves from pin 5 of IC6. LED D5 turns on when the subcarrier is applied to the unit. The 4800 Hz signal passes to two inverters (IC7) which provide short pulses to drive a switch (IC8) which, in turn, supplies the write pulses to the ADC.


ADC 0803
LM 567
4066
4066
IC1
IC2A
IC2B
IC3A
IC3B
IC4A
IC4B
IC5A
IC5B
IC6
IC7A
IC7B
IC8
IC9
R1 4K7
R2 22K
R3 47K
R4 47K
R5 4K7
R6 10K 10 turn
S1
D1 1N4148
D2 1N4148
D3 1N4148
D4 1N4148
D5 Led
Video input
To clock generator
To Memory Buffer Unit
To pin 13 of IC32F
To pin 8 of IC37B
MSB
LSB

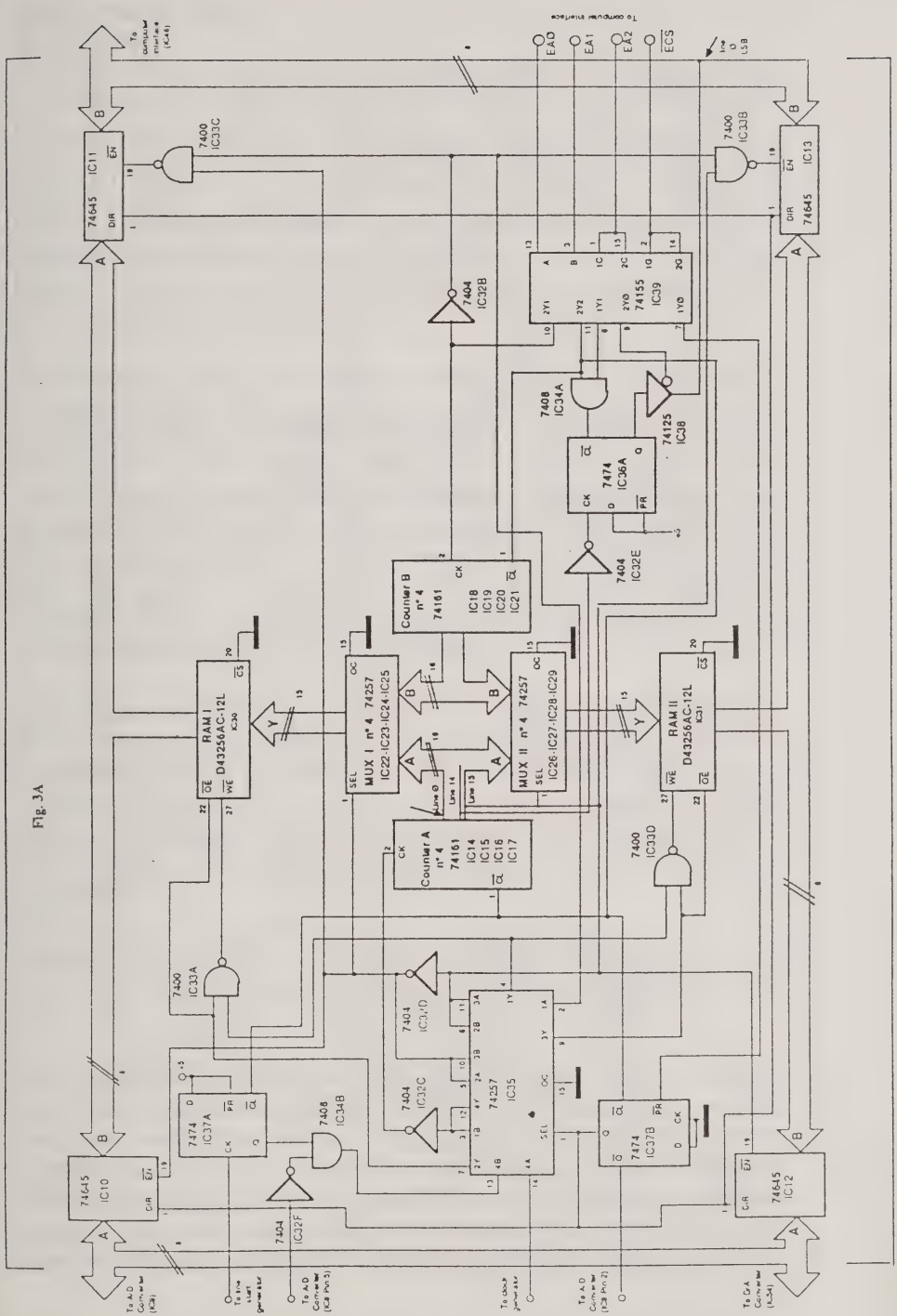

To computer interface
EA0
EA1
EA2
ECS
74645 IC11
7400 IC33C
7400 IC33B
74645 IC13
7404 IC32B
74155 IC39
7408 IC34A
74125 IC38
7474 IC36A
7404 IC32E
Counter B n° 4 74161 IC18 IC19 IC20 IC21
RAM I D43256AC-12L IC30
MUX I n° 4 74257 IC22-IC23-IC24-IC25
MUX II n° 4 74257 IC26-IC27-IC28-IC29
RAM II D43256AC-12L IC31
Counter A n° 4 74161 IC14 IC15 IC16 IC17
7400 IC33D
7400 IC33A
7404 IC32D
7404 IC32C
74257 IC35
7474 IC37A
7408 IC34B
7474 IC37B
7404 IC32F
74645 IC10
74645 IC12

Fig. 3A

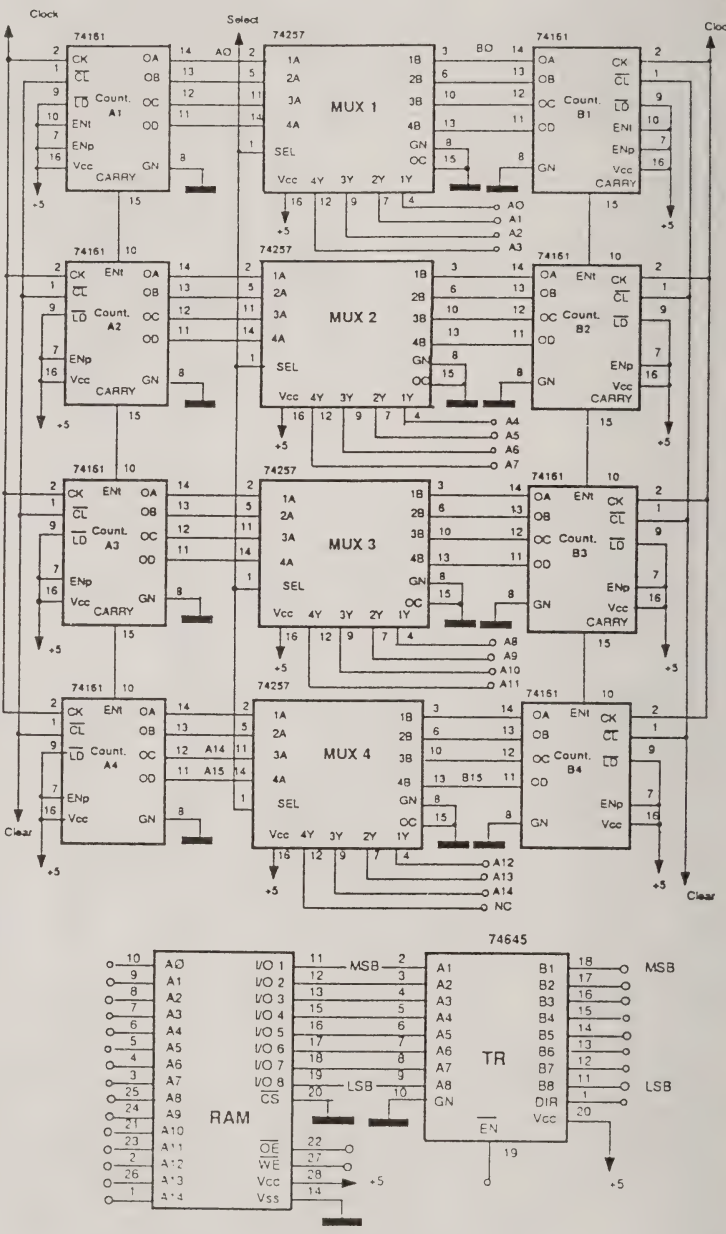

Clock
Select
74161
74257
MUX 1
MUX 2
MUX 3
MUX 4
Count. A1
Count. A2
Count. A3
Count. A4
Count. B1
Count. B2
Count. B3
Count. B4
CARRY
Clear
74645
RAM
TR
MSB
LSB
NC

Fig. 3b

Memory Buffer Unit
(Figs 3a,3b)
The interface is made up of two 32 kbyte static RAM banks (IC30-31), two address generating counters which are driven by the external unit (counter A: IC14-17) and the computer (counter B: IC18-21), two multiplexers (IC22-25 and IC26-29) which alternatively route the addresses from the counters to the proper memory bank, and four transceivers (IC10-13) which interface the external unit and the computer buses with those of the two RAMs. Multiplexer IC35 controls the right selection of the various controls signals according to the chosen direction of the data flow.

The computer acts on the Memory Buffer Unit I/O operations at an address between $300 and $307 (not all the addresses are used).In correspondence with these addresses, decoder IC39 generates five control signals. Address $302 re-initialises the whole circuit so that it is ready to output the data. The data direction is controlled by flip-flop IC37B whose output Q drives input DIR (pin 1) of the four transceivers (IC10-13) and input SEL (pin 1) of multiplexer IC35; the inverted Q output acts on the output buffer of the A/D Converter (IC9). Address $304 generates a pulse to the Preset (pin 10 of IC37B) so that the input is enabled.

Line 15 of counter A determines on which of the two memory banks the external unit has to operate leaving the other to the computer. To this purpose the signal from line 15 acts on the inverted ENs of the transceiver (pins 19), on the SELs of the address multiplexers (pins 1) and on the enable lines of the two RAMs. This signal applied direct to one of the banks and inverted to the other.

Data coming from the external unit is synchronised by a clock which advances counter A and gives the write pulse to the memory bank.

When Counter A restarts from 0 (modulo 2^{15}), the memory bank on which the external unit is acting is full; line 15 changes its level and switches everything to the other bank. At the same time the negative pulse on line 14 sets flip-flop IC36A thus signalling that switching has occurred. The computer reads the data from external memory, one at a time, acting on address $301. The same pulse from the decoder enables the transceiver and advances counter B.

After one of the banks has run out and the block of data has been saved, the computer controls output Q of flip-flop IC36A by reading at address $300. When it reads 1, it means that the other bank has been filled, therefore the reading process can continue. Flip-flop IC36A is reset by means of address $305.

The image, either raw or processed, can be sent from the computer to a Fax machine to be printed on paper. First of all the various units are reset so that they are ready to accept data from the PC. The computer reads a block of data from disk and fills a memory bank by writing at address $301. The decoder pulse enables the transceivers, the memory WR (inverted) and advances counter B. When the block is finished, there is a wait until flip-flop IC36A goes to 1, signalling that the other bank has been completely emptied.

The Clock Generator signal advances counter B thus synchronising the data flow from memories outward. The same clock enables the 8-bit D-type register (IC54) preceding the D/A Converter and provides the drive frequency to the Fax motor.

Here are two simplified programs for data input and output:

INPUT:

```
PORT [$302]:=0      RESET BOARD
PORT [$304]:=0      SET DIRECTION
FOR I:=1 TO NUMBER_OF_PACKETS DO BEGIN
        FOR J:= 0 TO 32767 DO
                MEMORY_BUFFER [J]:=PORT[$301]
        SAVE_FROM_MEMORY_TO_DISK
        REPEAT UNTIL (PORT[$300] AND 1)=1
        PORT[$305]:=0
END
```

```
OUTPUT:
PORT [$302]:=0
LOAD_FROM_DISK_TO_MEMORY
FOR I:=1 TO NUMBER_OF_PACKETS DO BEGIN
        FOR J:= 0 TO 32767 DO
                PORT[$301]:=MEMORY_BUFFER [J]
        LOAD_FROM_DISK_TO_MEMORY
        REPEAT UNTIL (PORT[$300] AND 1)=1
        PORT[$305]:=0
END
```

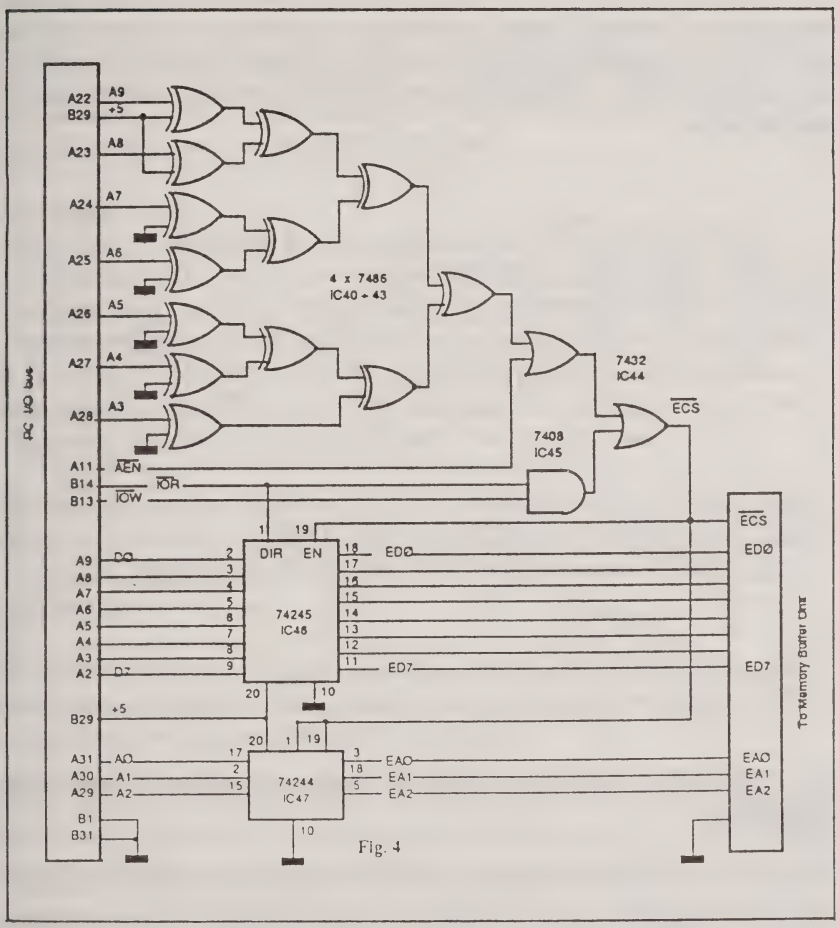


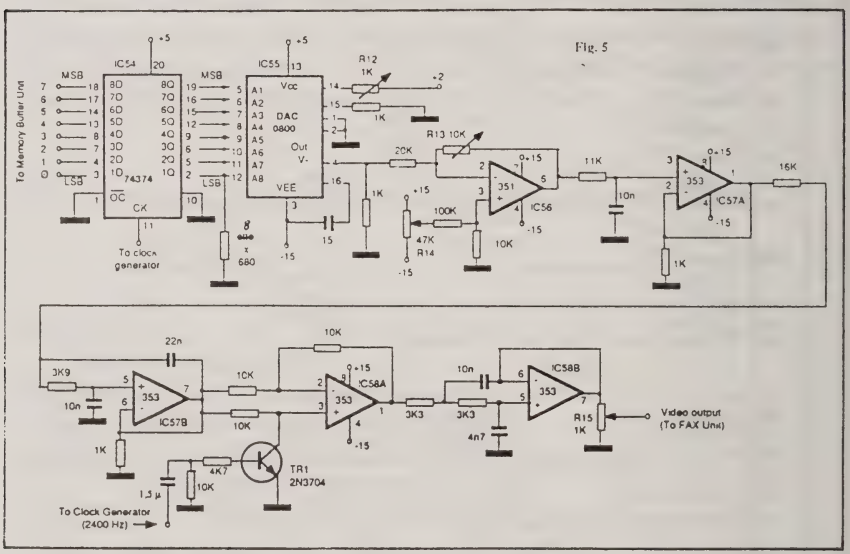
Fig. 4

Computer Interface

Fig 4

The Seven most significant bits of the address bus (A22 to A28) are compared with the corresponding bits of hardware- determined base address (in our case $300). When they match and I/O operation is performed. the inverted ECS (expanded chip selector) signal is generated. It toggles buffers IC46 and IC47 on and enables external hardware to be selected by a decoder (IC39 on the Memory Buffer Unit)

The 8 bit data bus (EDO to ED7), the three least significant bits of the address bus (EAO, EA1, EA2) and the inverted ECS signal are fed into the Memory Buffer Unit through a connector located at the rear of the PC system unit. Four separate shielded wires should be used for EAO, EA1, EA2 and inverted ECS in order to avoid mutual interference.



D/A Converter, Analogue Signal Processing Unit II and AM Modulator.

Fig 5

The 8 bit bus connecting the A/D Converter to the memory buffer Unit is also applied to an 8 bit D type register (IC54) to be clocked in order to get the proper aspect ratio for each image. The parallel word format is then sent to a D/A Converter (IC55) whose analogue output voltage at pin 4 swings from 0 to -5 volts for a binary input of 0 to 255.

The output is applied to an inverting amplifier (IC56) and passed to a low pass filter with a 3 db point at 1.7 kHz. The video is then fed into modulator IC58A.

A 2400 Hz signal provided by the Clock Generator is applied to the base of TR1 which acts as a switch that shorts pin 3 of IC58A to ground when turned on. When pin 3 is at ground, IC58A is an inverting one to one amplifier whose output is the inverse of the input. When TR1 is open, pins 2 and 3 of IC58A are at the same potential and the output is equal to the input.

IC58B is a low pass filter with a 3db point at 5.7 kHz which suppresses the high frequency components of the chopped modulated signal. The remodulated video can be sent to a Fax unit in order to get hard copies of the images.

Line Start Code

The frame of Meteosat is preceded by a line synchronisation code consisting of 20 lines (5 seconds). The black level is transmitted at the beginning of each line for 12.5 ms; the rest of the line (237.5 ms) is at white level. At the beginning of each image line a pattern of 2 white pixels followed by 2 black pixels is modulated in a sequence of seven cycles. The alternating pattern simulates a frequency of 840 Hz in a rectangular wave form.

The swaths of the NOAAs are preceded by 7 sync pulses which identify the two channels whose synchronisation rates are: 7 cycles of 1040 Hz for channel A, and 7 pulses at 832 pps for channel B.

The line of Meteors includes a single image; at the beginning of the line there are several sync pulses (the number varies from satellite to satellite) producing a frequency of 256 Hz.

The Fax images and the weather charts transmitted on LF and HF band are preceded by a line synchronisation code consisting of a number of lines with a white level at the beginning of each line.

In this project we detected only the 832/840 sync pulses of NOAA channel B and Meteosat, therefore the Line Start Generator we describe is centred at 836 Hz. We did not build another Generator because this one works properly also for Meteors.

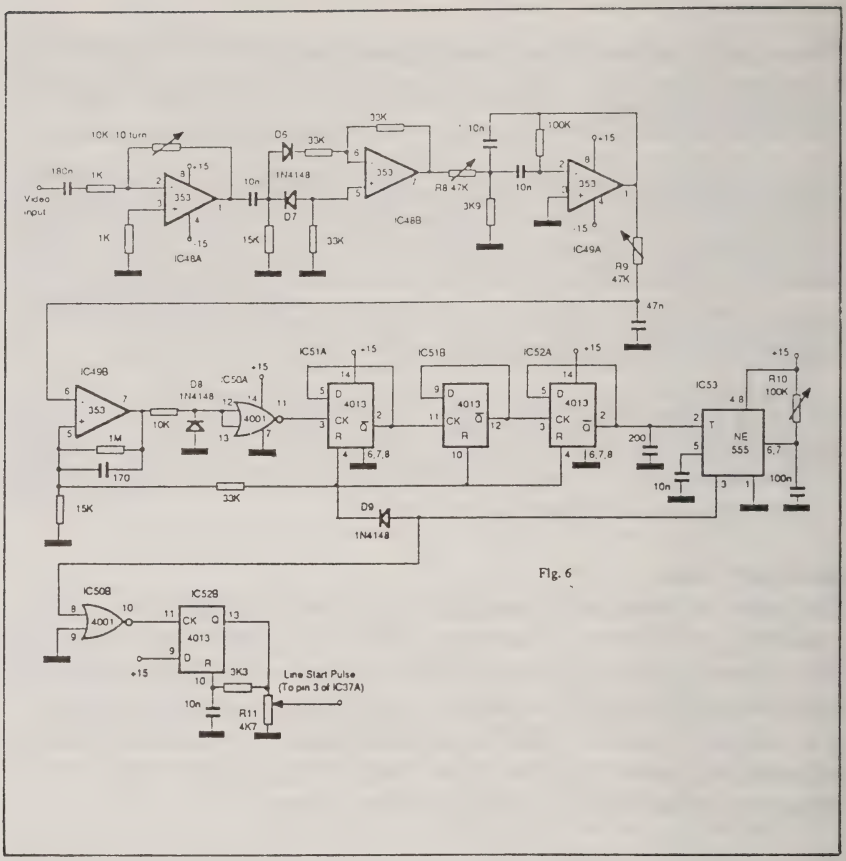


Fig. 6

The Line Start Generator

Fig 6

The 2400 Hz AM modulated subcarrier is amplified by IC48A, demodulated by D6 and D7 and amplified by IC48B. The signal then passes through an 836 Hz bandpass filter (IC49A). The 836 Hz burst is then peak detected and squared by Schmitt Trigger IC49B. After being inverted by IC50A, the burst drives a divide by four binary counter consisting of IC51 and IC52A. On the fourth count, delay one shot IC53 is triggered which resets the counter and Schmitt Trigger, and provides the sample pulse for the sync pulse generator IC52B. This generates a 50 microsecond pulse signalling the start of each line.

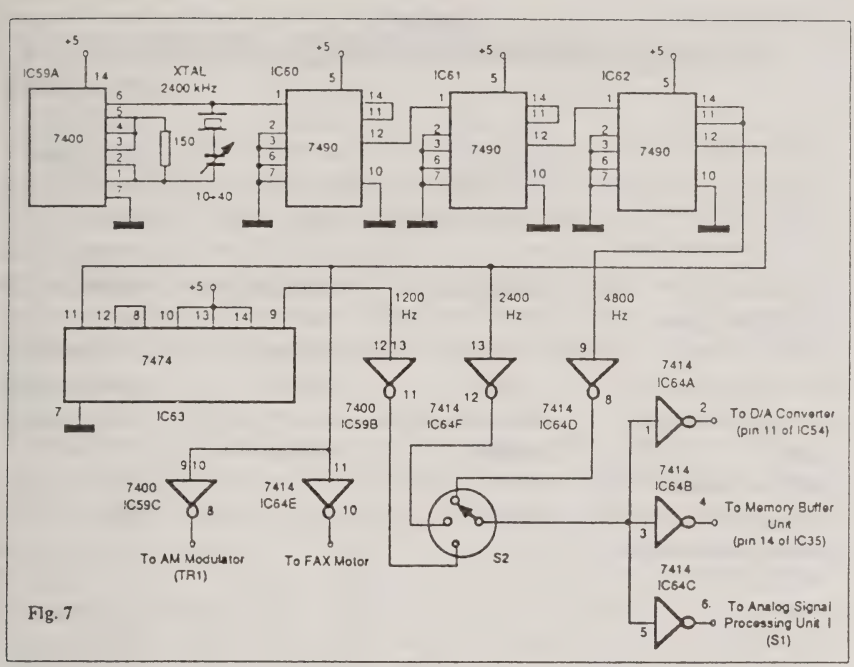


Fig. 7

Clock Generator

Fig 7

Oscillator IC59A is controlled by a 2400 KHz crystal. The 2400 KHz signal is divided by IC60 through IC63 in order to get 4800 Hz, 2400 Hz and 1200 Hz. These frequencies are buffered by IC64 and IC59 and selected by S2 before being sent to: a) S1 of the analogue Signal Processing Unit I to provide sampling frequency to the Meteors or the LF and HF band pictures and weather charts, b) the Memory Buffer Unit and the D/A Converter to establish the pixel number per line in the hard copy printing mode. A 2400Hz signal is supplied to the AM Modulator and is provided as a drive frequency for the Fax motor.

Acknowledgements

The Analogue Signal Processing Units I and II were described by Grant Zehr in The VIP: A VIC Image Processor, QST, August 1985, pp. 25-31. The Line Start Generator and the AM Modulator are partly derived from: C.H. Vermillion et al, Weather Satellite Picture Receiving Stations, APT Digital Scan Converter, NASA TN D-7994, 1975.

Table 1
Analogue Weather Picture Characteristics:

	METEOSAT WEFAX	NOAA APT	METEOR Series 2 & 3
Transmit Freq.	1691 MHz CH A1	137.50	137.30
	1694.5 MHz CH A2	137.62	137.40
			137.85
Polarisation	linear horiz	Righthand circ.	Righthand circ
Carrier Modulation	FM	FM	FM
Carrier Deviation	+/-9kHz	+/- 17kHz	+/- 15kHz
Subcarrier frequency	2400Hz	2400 Hz	2400Hz+/-10%
Subcarrier modulation	AM, 80% mx=wh	AM, 87% mx=wh	AM,90%mx=wh
Video	1600Hz	1440Hz	
Lines per minute	240	120	120
Index of Cooperation	267.36	576	264

mx=wh max = white

AN UNEXPECTED CHRISTMAS PRESENT

James Brown

Now what, I wondered, was in that large flat box from my mother? A shirt possibly, or a cardigan? Shock! Its Rig's latest PCSAT-3. Mother gets big thankyou, but am left wondering how she knew what I wanted, and where to get it. Does Henry have some clandestine dealings with the relatives of RIG members? Has she been offered this as a free gift if she'll buy a time-share apartment in Sutton St. James (Yet to be completed)? Anyway, time to unpack.

Nice looking interface board - but not happy about the lack of gold-plated edge connectors though, the long-term integrity of my PC's delicate digital fingers is at stake. Nevertheless, install board and examine sockets. A 9 pin D-type plus a small jack socket. Great, bound to have a small 3.5mm jack plug to get the signal in...consult manual...jack is audio out! Do you think I've got a 9 way D-plug on Christmas Day? 25 pin jobs, even a seven pin edition, but no 9 pin. Should I wait until the shops re-open? Out with soldering iron, and extra jack socket soon installed! Manual tells me there's a set-up programme for checking that the peak signal level is correct. Adjust pot on board, for a good clean signal on Meteosat. Run main programme, adjust graphics for my Trident VGA card, and sit-back for first signal. Superb! Picture edge is absolutely straight, and somewhere near 64 grey levels are clearly visible. Compare with frame-store. Nice to have a full picture on the screen. Try zoom feature. Bit pixely but does its job, and nice to be able to wander round the screen at will. Anyway, can't be anti-social, rejoin family for rest of day.

Following day - feel confident that family will understand need to dig deeper into new toy. Decide that audio output levels from the different satellites will vary so much that life will become a pain if I have to go around the back of the PC to alter the gain control every time I change satellites. Make up a little card with a ten-turn pot for ultra-fine adjustment of levels. Turn to the polar-orbiter section. Attempt to run VGASAT in Trident's 640 x 480 x 256 colour mode. (It also has a 600 x 800 mode, but not a lot of people seem to know that - except perhaps VPIC - a great graphics display programme from Compuserve). Screen reports 'Can't run in this mode' Hmmm. Consult manual. Manual tells me Meteor & Okean programmes may

only support Paradise Tseng and IBM graphics - doesn't mention any problems with NOAA. Try other settings of graphics card - each one fails until - horrors - standard IBM is selected. Attempt acquisition of signal. Select auto-scroll - picture builds up, with once again a superbly straight edge, even maintaining itself through some noisier moments at the end. (More sun-spot activity). Reselect best Trident graphics mode - display picture, and lo and behold, all 64 grey levels appear to be there. But why can't I have it while I'm reading in the picture - must ask Timestep. Quite enough exertion for Boxing Day.

Sometime later... Decide to try out the SATSHOW programme. First get an image saved on disk. Now import it into Satshow. Oh no! Top part of image is fine, but bottom is split into about twenty repeated segments. Attempt different graphics settings, but all to no avail. Know enough now about displays to know that there's some incompatibility between the Trident card and Sat-show. Forget it, I've got VPIC, not to mention CSHOW, PCLAB, IMDISP.... Never mind, import the picture back into VGASAT and have great fun adding false colour, and playing around with the thresholds. Found I can identify approximately the 0 degree temperature level, and its useful to set up a palette to show everywhere that's gone into frost. Time now to give Meteor a try. Help! The picture is gracefully skewing across the screen at an angle of about 20 degrees. Very smooth, but completely unlocked! Try all sorts of changes of level settings, card set-ups etc. All to no avail. If timing is a problem, perhaps my 386SX is running too fast, drop out of turbo mode..wonders, the thing is stabilising, a bit rough, but readable now. Just got about the last minute of the pass. Next pass is Met3/3 doing infra-red first. Oh dear, some lines are shooting out across the screen again in a random way, soon as visual comes up, pictures locks up fine again, albeit in slow-mode. Phone Ian Hanson who's also got PCSAT3 with a 33mHz-386 & Orchid Card (shades of green!) No he's got no problems with the software at all, everything runs as it should. Groan!! Time now to take my moans back to Timestep.. The nice thing about the company is that when they're not away at exhibitions, you get to speak to the people who designed and made the thing themselves - not some idiot box-shifter who says 'dunno sir' or worse, 'the bloke who deals with it was run over by an ambulance on the way to work sir, and there's no-one else who can deal with your problem for three years at least.' And they're based in the UK too! Talking to David Cawley reveals that because of a problem with getting the Trident cards to

scroll, they had to stick to IBM graphics to get it functioning. They're sorry SATSHOW didn't work properly, but there are so many implementations of the Trident chip-set that my card is one of the ones which doesn't conform. Fair point. The Meteor problem they'll look into. A day later a soft-ware update is on its way to me. Yes, there was a bug in the programme caused by a combination of my machine and card. Try new software - brilliant. All problems gone. Ultimate test is OKEAN. Amazingly, in OKEAN's visible + telemetry mode, the picture locks up almost perfectly, though it's a lot less noise tolerant. However, the jack-pot comes a day later when OKEAN does a radar pass right down the British Isles! Well I've never seen it before! This time, fumbling between the frame-store and the PC, and falling over wires whilst trying to record the whole thing leaves me in a shambles. So you will not be seeing a picture in the next RIG!! But the lock was less satisfactory than with the visual picture, but it was there for part of the time, honest!

Final phase is to try animation programme. Aaaaagh! Picture is reduced to a thousand slices skewed again across the screen. Another phone-call. Yes there are certain problems with 386 type machines, and certain memory managers. Would I like to try their new full-screen animation programme. Would I?! Ah, now you're talking. A mouse-driven, full-screen 16 grey-level with adjustable grey-scale contour settings, zoom, and animation from memory or hard-drive. The all singing- dancing... First thought, is that it's bound to fall over with my system. But lo and behold, try as I might, (and my perfectionist tendencies can be quite ruthless at times!) it worked faultlessly. Time settings can be altered as per the previous programme, but now you can set the area of a METEOSAT or GOES screen that you want to observe by walking a flashing rectangle around the whole image area, contracting or expanding it as you desire. You can set your own grey-scale up, or use the built in linear or enhanced modes, which in Winter in IR means you can still use all sixteen grey-levels. I tried it out at the on-set of the really snowy weather, and it was absolutely brilliant. Zooming in on the British Isles, you could clearly see the fronts bringing the snow, developing and marching across the country. I have 2 MEG of memory in my machine, and the programme identifies automatically all my extra memory, and tells me I can have up to 12 images in memory at any time. Although if I opt for disk-driven animation, then the capacity is the capacity of the spare space on my disk! Speed at disk-animation with a 28ms drive was just under a frame per second, more than adequate. If you decide to work

from disk though, the programme is constantly accessing your hard-drive, and there isn't a non-animate, but receive mode. Timestep say, with a degree of fairness, that extra memory is now so cheap (35 per MEG approx.) that really memory animation is the way they see the programme mostly being used.

So am I going to ditch my frame-stores? (Including a special 10 frame animation job?) Absolutely not. I use my computer so much during the day and night that I would need to buy a new one, just for the purpose of running PCSAT3. The frame-stores I can leave running, and carry on working whilst checking the pictures. But for serious work, I stop what I'm doing and call up PCSAT3 every time. I wouldn't ditch the frame-store either, because for satellites such as METEOR and NOAA which output data at 2 lines per second, full resolution is actually 1200 cycles of the 2.4kHz signal per line, double what PCSAT can show horizontally, and if the satellite is capable of modulating the bottom half of the sine-wave to a different level from the top, then that figure is doubled again. If you examine a zoomed picture of the Alps taken by METEOR and compare it with a frame-store picture in METEOR x 2 format you'll notice the difference. Will I be disposing of my mother's Christmas present then? You must be joking!! There's nothing around to remotely touch it, specially at the RIG price. My frame-store doesn't do colour, it can't save or load images, once the image is in I'm stuck with it. You need an extra clock signal to synchronise taped and Russian signals, the resolution is a quarter of PCSAT3's, and I can't tell it to get a picture and keep it while I'm out. I may be biased, but both in terms of the friendliness of RIG officers and the helpfulness of TIMESTEP, and the generosity of my mother, it's been a good Christmas!!

FOR SALE

Coaxial cable 0.5" diameter, 2.33mm centre conductor, copper tape and screen - 50p/metre + p & p.
Copper clad PCB material, various types / grades available
e.g. single sided 1.6mm F Glass 3" X 8" 50p + p & p
Phone for availability 0536 - 520457 Malcolm Grant

WANTED

Weather SAT. Receiving Equipment e.g. receiver, downconverter, info on loop yagi - 0536 - 520457

IT'S ALL HENRY'S FAULT...

Mike Goodall, G0MGI

It was back in the Autumn of '89 that I was first introduced to Satellite pictures. I have known Henry, the Chairman for more years than I care to remember. Like him, I was always interested in any new innovation in Science or Electronics. Guess what the swine did? He brought a working satellite receiving station up to the Radio Club in March, Cambs. where we meet each week. Too late, I was hooked. As an amateur astronomer, a radio amateur and with an interest in meteorology, I just couldn't resist having a go at Weather Pics. Also, I convinced myself, it would have a practical value as well. I could see in advance the oncoming cloud and assess the probability of a good clear night (or not) for my astronomical observations.

A cheque was quickly sent off to Dartcom for a RX board. I had seen all the adds for the different makes and considered this to be the best buy for the future. Should I have the ordinary led channel display or go for the more costly digital display version? Past experience told me to go for the digital one. How many times in the past had I bought the cheaper option, later to regret it. The extra cost of the display has proved well worth it. In the meantime I ploughed through the mine of information in the old RIG mags Henry had lent me and sent off my £6.00 for membership. A small neat case was purchased from R/S and when the board arrived it was installed with due haste. In the meantime Henry had lent me a working system for a few days, which was hooked up to a two-metre dipole, but it had to be returned. How could I live without it?

Originally a standard type mains transformer was installed in the rx box, but it did introduce a little noise into the system. It was replaced in due course with the proper toroid type and the interference despaired. I never could really understand why, but it did the trick and that's all that matters. Now for the antenna. The top of the garage roof was littered with the remnants of past deceased amateur antennae and within a few hours a crossed phased dipole was constructed and hitched aloft. It worked very well, and a good signal was received from the first pass of a NOAA satellite. But the brain can't make much use of the clacking audio signal on its own, so a frame store was urgently needed. A phone call to Henry revealed that all frame store pcbs had long been sold,

and that they were waiting for the first production of the new updated version. I am not a patient man, as my wife will confirm! "Hang on", he said. "I believe there is an unused set in the hands of one of our members, who was hanging on till the new ones come out" (I hope he didn't hold his breath)." He may not need them now". After the customary exchange of cash, they reached my eager hands. The parts had already begun to accumulate in a little box marked "framestore" and the arduous task began. I like to get on quickly with projects and most are completed the same day. This one took two days plus the setting up. It doesn't matter how many times you check all the connections on the pcbs, you always miss one or two! When these were found and rectified the whole thing actually worked. But only one frame at a time was a nuisance. A visit to a friend in the computer trade soon produced some 256 memory chips, and now I had four pages! The next thing to do was improve on the picture quality. The signal level was good, as was the definition, but I felt I was missing out on the detail in the grey levels. Relying on the input level on the frame store and the brightness and contrast controls on the monitor was not producing the desired results. Henry said try the Dartcom Range Adaptor pcb. Anyone using a frame store system without one is strongly advised to try it. It made the world of difference. Those low contrast IR pics came up like the VIS ones, and a lot more detail was now visible. Now, with the aid of the rig Noaa predictions and the Russian satellites, good quality pics were received daily. But not always when you wanted them! The answer was obviously a Meteosat downconverter. This was duly ordered and in the meantime a loop yagi was constructed to the dimensions given by the chairman. I had already made, some years previously, a 23cm amateur version of this beasty, so the technology was not new to me. A one metre dish would have been better, but there was simply no room left to mount it.

The downconverter duly arrived and was mounted in a waterproof box. It was connected to the loop yagi and rx and behold a signal! A little noisy but there. Slight adjustments to the elevation and azimuth produced an almost noise-free picture. Although the Meteosat pictures give nowhere near the quality of an overhead Noaa pass on the UK, at least they are there when you need them. The whole system worked well and I settled down to many months of receiving daily pics of excellent quality.

Then, would you believe it? Henry did it again. When I walked into our Radio Club meeting room, there was a computer based receiving system. It could manipulate the stored pics, colour them and show them in much more detail than the frame store system. Well, I already used an Amstrad PC1512 system indoors, but with mono CGA graphics it was obviously a non starter. I had been thinking of upgrading this to a 286 VGA system for some while, and this seemed to be the ideal time. As a special Christmas present to myself, I purchased a PC286 and Multisync VGA system, together with a Satellite Interface card. Routing the audio signal from the garage, where the RX system resided, to the dining room presented no real problem, although the customary remark was made by the wife from an adjoining room "Not Another Wire!", as I was nailing up the coax to the door frame.

I settled back in my computer chair and booted up the program. It worked first time. Setting up the levels produced a wonderful picture, and if you wanted to save it you had the option of keeping it on hard or floppy disk. Zooming in on the UK, and setting up your own palettes in colour and stretched contrast has opened up a whole new world of experiences. This system will have to last me for some considerable time into the future. Famous last words! If Henry is intending on bringing any new systems up to the Radio Club, I hope he lets me know in advance, I promise to be absent on that night!

MET3-4 LAUNCHED - KEPLERS 137.3mHz

Designator 91 30A, Epoch 91114.50941607, Inc. 82.5439, Drag.00000005, RA 262.4118, Ecc .001696, Arg P 184.4062, Mean Anom 175.6948, M Motion 13.15965265, Orbit 4

For those of you that need it working out:-

110 minutes				27.5 degrees	
04 MAY 02:08	358	11 MAY 02:01	8	18 MAY 1:53	18
25 MAY 23:39	358	1 JUN 23:32	8	8 JUN 23:24	18
15 JUN 21:27	0	22 JUN 21:19	10	29 JUN 21:12	20
6 JUL 19:15	2	13 JUL 19:07	12	20 JUL 17:10	355
27 JUL 17:03	5	3 AUG 16:55	15	10 AUG 14:58	357
17 AUG 14:50	7				

NOAA D(12) --- Launch Date --- MAY 14

CURRENT POSITION --- LNA KITS

Chairman

Many of you may have seen Henry's latest version of the LNA at the Sandown VHF Convention. It uses easily available components mainly from Surface Mode type technology. All of these, except the active devices, cost in the 5-10p range. Even the PCB is cheap in that it is just a piece of unetched material. The plugs were also inexpensive. I used silver plated UR43 type N plugs but gold plated ones would have been better. I have still used the UT141 cable because of the ease and convenience it gives, not to mention the fact that the dielectric is PTFE and relatively Henry's soldering iron proof! It was not complete at Sandown but was soon afterwards. It was tried out and worked first time! It's life-expectancy is dubious now it's in Henry's hands!

Performance

It should have a noise figure below 1db and this is equivalent to a noise temperature about say 50 degrees Kelvin ie. -225 degrees centigrade! As soon as you connect anything that is resistive at room temperature you defeat the object of having such a low noise device. For example if the input was terminated in either a dummy load or a resistive 50 ohm attenuator pad the noise temperature goes up. To maintain these low noise characteristics an aerial must be connected and pointed at the cold (radio-wise) sky not the sun or moon. You might now appreciate the necessity of keeping any ground spill to a minimum or non-existent. Any trees or manmade objects included in the aerials polar diagram will increase the noise output. By moving the aerial around the cold sky you should find a quiet position. In this position the LNA will perform at its best for test purposes. Any test readings should be done now because everything else will be worse. My best reading was 22 on a FSD of 120. I then compared this with the noise level when pointed at the Sun, this gave me a reading of 35. The Moon gave a similar reading and so did the ground. This may not sound a big increase but it is really, even though it could possibly be improved upon. Unfortunately the noise figure has been measured at 1.4db.

Late News Performance improved to 0.59db - optimisation of bias. It looks as if its going to be OK and still use cheap components! The price of the kit could be as low as £25. I have several cheques, which have not been presented yet. We shall make it right with you when final details are fixed. In the meantime, if you require further information please contact the chairman. Later News - see page 67

SPACETECH AND 8MEG ARCHIMEDES

Barry Haines G8FAT & GB7BST

I have just had my Archimedes 410 upgraded with an ARM3 and 8 Meg RAM and found that the SPACETECH weather satellite system will only treat it as a 4 Meg system so here are the mods I have used to use the full 8 Megs

Framestore

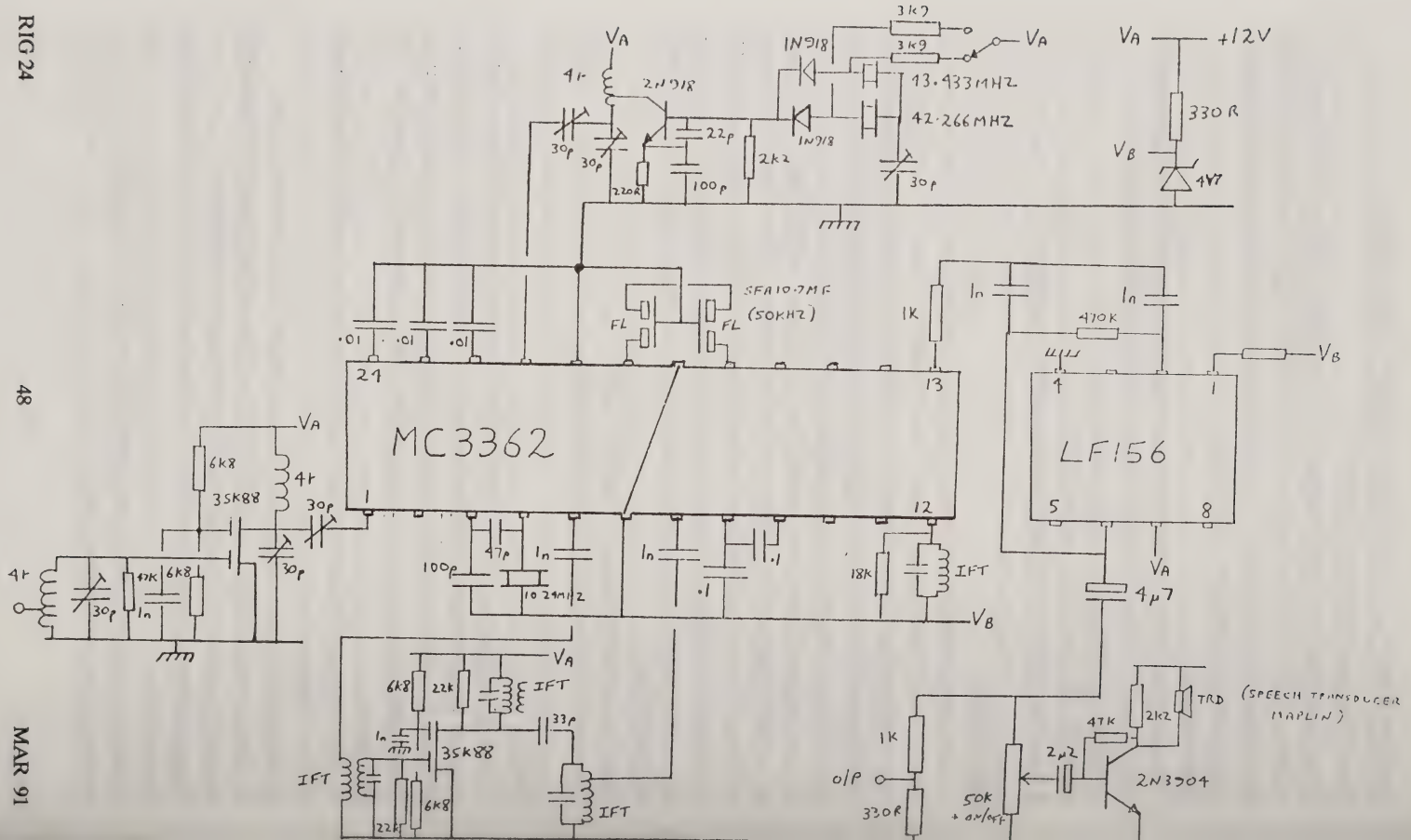
First open up the framestore app by clicking on! framestore while holding shift. Load the obey file into edit and change the line :-
WIMPSLOT-min 320 K -max 4000 K to
WIMPSLOT-min 320 K -max 8000 K
Save this and that's it for the framestore package.

METEOSAT

I have only made changes to the hi-res animation but the extended one should be similar. Load the animation.! boot file into edit and you will basically see a load of rubbish but somewhere around the middle you'll see something like @400000{0 change the 4 to 8 and save. This is an executable file so it will not make any sense. If you do understand the file you might let me know what I have just done as I don't, I just took a shot at it and it worked. (They say ignorance is bliss). This will allow the system to use all 8 Megs but it will crash at about 63 frames. To over come this go down to the directories till you open CODE. then load the basic programme called ANIMATION.
On line 20 redim FS$ (77) to FS$ (120)
On line 30 redim DS$ (60) to DS$ (120)

TIPS

If like me you take the three NOAA passes around lunch time I would recommend you set wimpslot -min to 4000k. Then if you forget to allocate memory at desktop you'll still have plenty allocated to the task. If you suffer from interference then try the following.
1. Run the audio lead through a ferrite ring a couple of times near to the phono plug.
2. Replace the keyboard and mouse leads with screened ones.
3. This can also apply to grotty PC's. Dismantle the key board and spray the inside of the case with nickel screening paint.
If the above fails switch of the computer and go back to the old YU2 framestore..
In Barry's article in RIG22 we omitted the circuit diagram.
It should be on the next page.


MC3362
LF156
2N918
IN918
IN918
13.933MHZ
42.266MHZ
SFA10.7MF
(50KHZ)
FL
FL
35K88
35K88
IFT
IFT
IFT
IFT
2N3904
TRD
(SPEECH TRANSDUCER MAPLIN)
+12V
VA
VB
VA
VA
VA
VA
VB
VB
VB
330R
330R
2K2
2K2
1K
1K
470K
47K
50K
+ on/off
2µ2
4µ7
18K
6K8
6K8
6K8
6K8
22K
22K
220R
100P
47P
33P
30P
30P
30P
30P
30P
4T
4T
4T
10.24MHZ
0/P
1n
1n
1n
1n
.1
.1
.01
.01
.01
21
13
1
12
1
4
5
8
4µ7

REMOTE IMAGING GROUP

Statement of Income & Expenditure

for the Year Ended 31st December 1990.

Expenditure		*Income*	
LNA	125.56	LNA	2406.78
Pre-Amps	89.66	Pre-Amps	218.18
Down Converters	790.01	Down Converters	350.91
Receiver	623.16	Receiver	646.11
Feed	625.60	Feed	505.22
PC Sat3	4790.36	PC Sat3	5529.00
Misc	580.09	Dish	722.00
		Misc	309.05
Stock Movement	2690.07		
Total	**10314.51**	**Total**	**10687.25**
Net Income C/Fwd	372.74		
Newsletter Printing	3705.32	Net Income B/Fwd	372.74
Newsletter Post	1748.59	Subscriptions	6185.00
General Post	104.45	Back Issues	550.75
Secretarial Services	145.00	Adverts	155.00
Rally Expenses	157.60	Commission Rec,d	522.80
Committee Expenses	198.86	Donations	134.13
Bank Charges	6.00		
Office Expenses	614.41		
Depn of Office Equipt	738.50		
Total	**7418.73**	**Total**	**7920.42**
Surplus of Income Over Expenditure	501.69		

REMOTE IMAGING GROUP

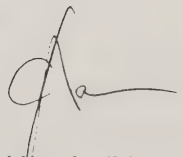
Balance Sheet

as at 31st December 1990

Emplyment of Funds		Funds Employed	
Office Equipt (1)	3692.50	Surplus B/Fwd	9221.31
Less Depreciation	(1215.50)	Surplus for Year	501.67
Stocks - Equipment (2)	2973.00		
Stocks - Newsletters	850.00		
Cash at Bank/In Hand	3422.98		
Total Assets	**9722.98**	**Surplus C/Fwd.**	**9722.98**

REMOTE IMAGING GROUP

I certify that I have prepared the Statement of Income and Expenditure and the Balance Sheet from the vouchers and records of the Group and that they represent a true and fair view of the financial position of the Group as at the 31st December 1990. Where the records were incomplete I have relied upon the explanations of the Chairman and Members of Committee. In preparing the accounts it has become evident that the accounts were incorrectly stated at the 31st December 1989 in that the Closing Stock and Bank Account position were incorrectly recorded. I have found no evidence of any intent to misrepresent the true accounting position but rather a lack of good recording of information which I have brought to the attention of the Chairman. In the circumstances I have set the balance sheet to a correct position as at the 31st December 1990.



C J Harwin F.C.M.A
for The Remote Imaging Group.

7th April 1991

WEATHER PICTURES FROM THE SCREEN

Les Hamilton

I mentioned briefly in my letter published in Rig 20 that I would be investigating the possibility of preparing useful weather satellite images by photographing displays on the Archimedes VDU screen. The idea has aroused interest elsewhere, both David Woods and Allen Drew have been pursuing the same track, and have produced pleasing photographic results.

Since I am sure that there must be a number of amateur photographers who can handle their own development and printing amongst the Rig members. I am detailing steps I have taken in this field. Indeed, Allen Drew has shown me some colour prints he has taken. These have been printed commercially, and, though just 4" x 6" in size, are very crisp and attractive.

I have been using a Spacetech weather satellite podule in the Archimedes Microcomputer for a year now, and have been highly delighted with the outcome. At normal viewing distances, the image on the monitor screen are close to photographic in their detail and clarity.

After making a number of attempts at this project. I have now standardised my procedures, and find that they give acceptable quality. Of course, screen resolution (640 x 256 pixels) on the Archimedes VDU does place a limiting restriction on the clarity obtainable but, viewed at normal reading distance, results are far superior to anything produced by screen dumping to a dot matrix printer. On the debit side, photographs are much more time consuming to produce, but they do afford a much better control of image contrast and total range. That said, they cannot, of course, match your superb Rig centre spreads.

Film

Earliest work was made with FP4 (because I had some in stock), a medium speed film. Many of the negatives resulting were lacking in contrast and detail, and while a few prints were worth the effort, the majority were hardly outstanding. I now use KB14 black and white negative film (obtainable from Jessops). This film is fairly slow with an ISO 50 speed rating, but has the advantage of a very fine grain and produces highly contrasty negatives, ideal for capturing maximum image contrast from the VDU screen.

VDU Setting

In order to give my self the greatest chance of success, the monitor contrast and brightness controls are both turned to about 75% maximum. Small variations are made to optimise individual images. With the camera mounted on a tripod in a darkened room, and using a cable release to activate the shutter, exposures were of 8 to 10 seconds at 8 feet.

Images were first displayed using the 16 shade grey scale option provided in the Spacetech system, the 16 shades were mapped over the entire luminance range of the image. Finally, sea, which usually occupies 3 or 4 shades, was altered to a full black to give the maximum contrast between land/cloud and sea. This also means that the screen pixel pattern does not intrude into black areas of the resulting photographs.

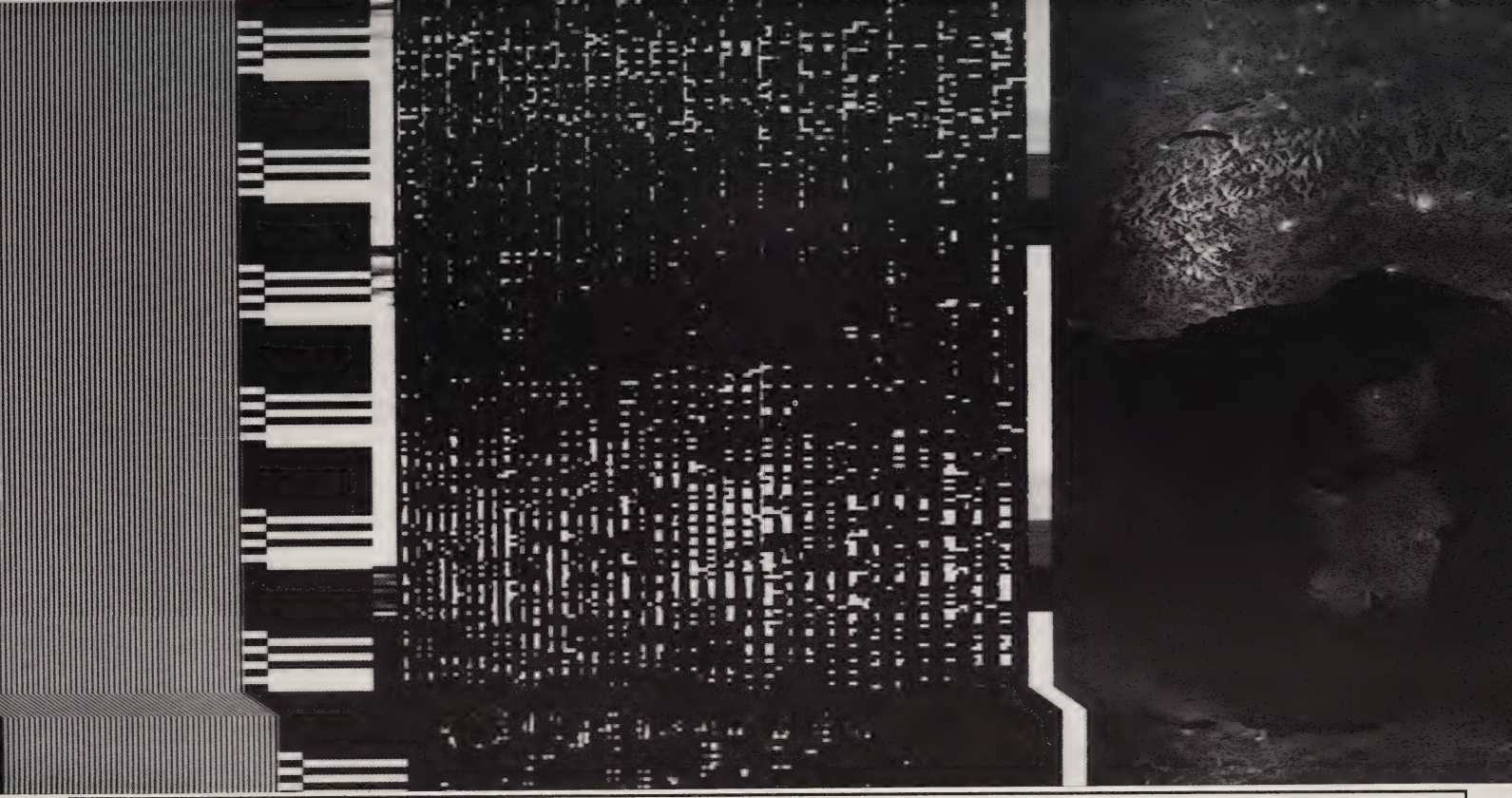
As noted above, the screen resolution is one limitation that cannot be improved upon. It is therefore important if it is desired to show an enlargement of Britain (or anywhere else), NOT to rely on a blow up from the negative this will simply enlarge the underlying pattern of screen pixels. It is vital that the original framestore image itself is zoomed before photographing it, and that all photographs are made from the entire photographic negative.

Camera set up

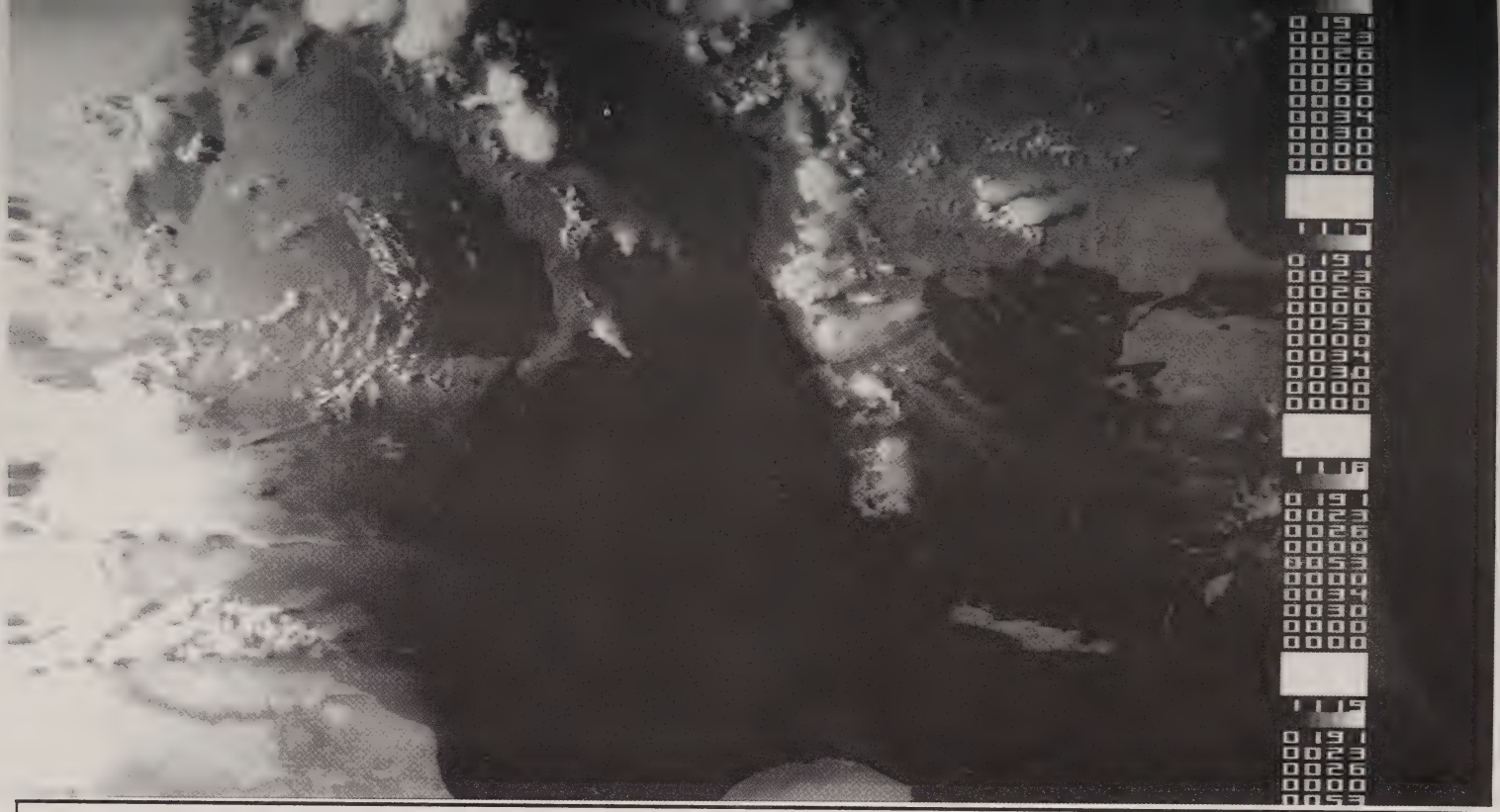
To achieve the crispest focus, a single lens reflex camera is desirable, preferably fitted with a medium focus telephoto lens (and possibly a close up tube as well). Use of the normal camera lens can lead to image distortion due to its proximity to the VDU when taking pictures. I have been using a 135 mm telephoto lens plus a 10mm extension tube. A further aid to sharp imaging is to stop down the camera lens, and use a long exposure time. All my images were photographed using apertures of f8 or f11 with corresponding shutter speeds of 8 to 10 seconds. To achieve these long exposure times, a tripod and cable release were used, with the camera shutter on the B setting. This means that the shutter opens when the release is activated, and remains open until it is released again. A stopwatch is used to measure the time intervals.

Developing and Printing

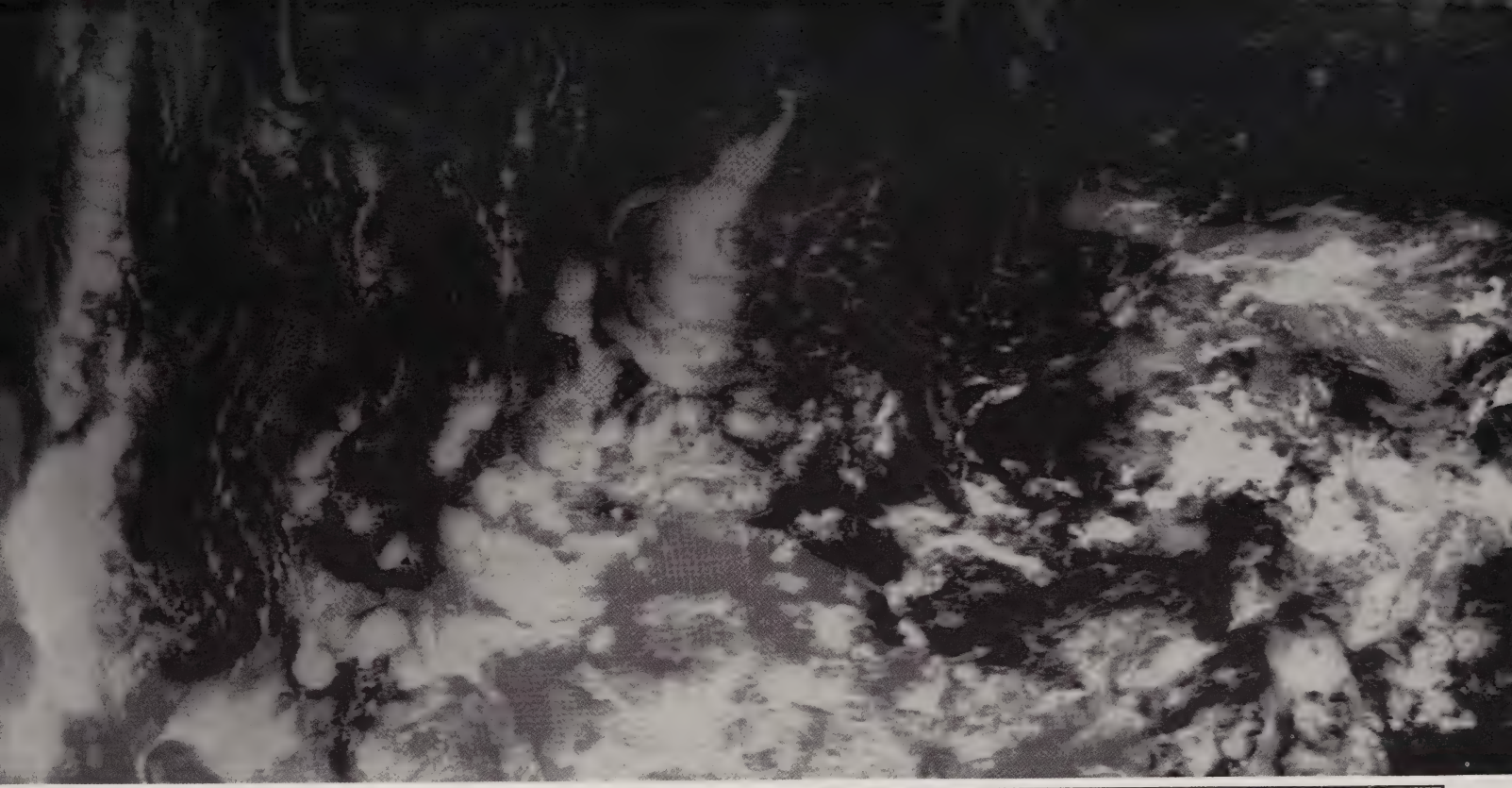
Development of the exposed film as per manufacturers instructions led to a set of uniform negatives, showing high contrast and plenty of detail.



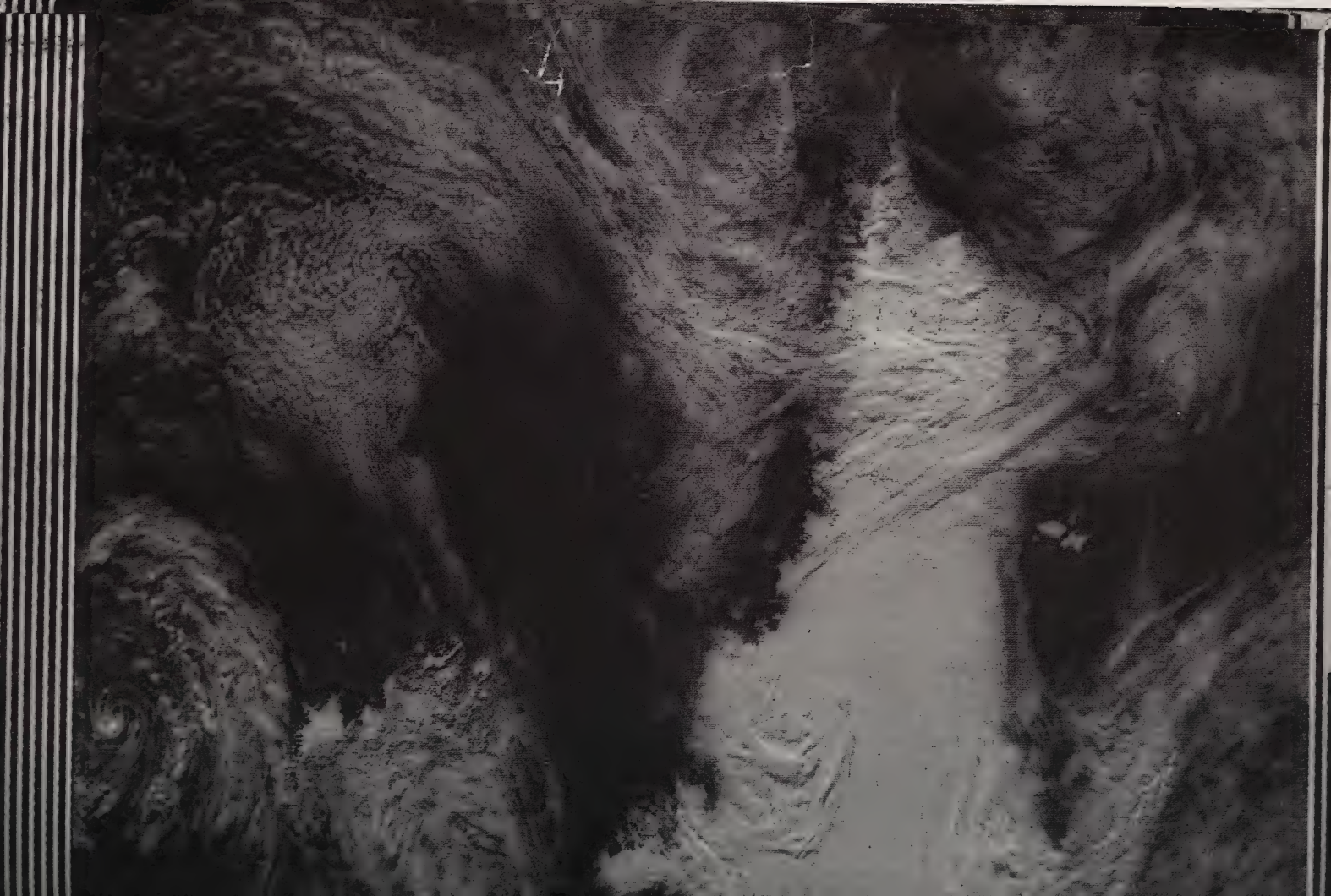
Okean-2, 17 September 1990, 1222-1233 GMT, descending.
The swath goes from the Norwegian Sea to Tunisia (there was loss of synchronisation south of Sardinia). Was it taken with a Synthetic Aperture Radar Sensor? Which of the two images? The picture on the right shows the cities as white spots. The most prominent are Hamburg, the large cities of the Ruhr district and those along the Rhein, and, South of the Alps, Milan, Turin and Genoa.

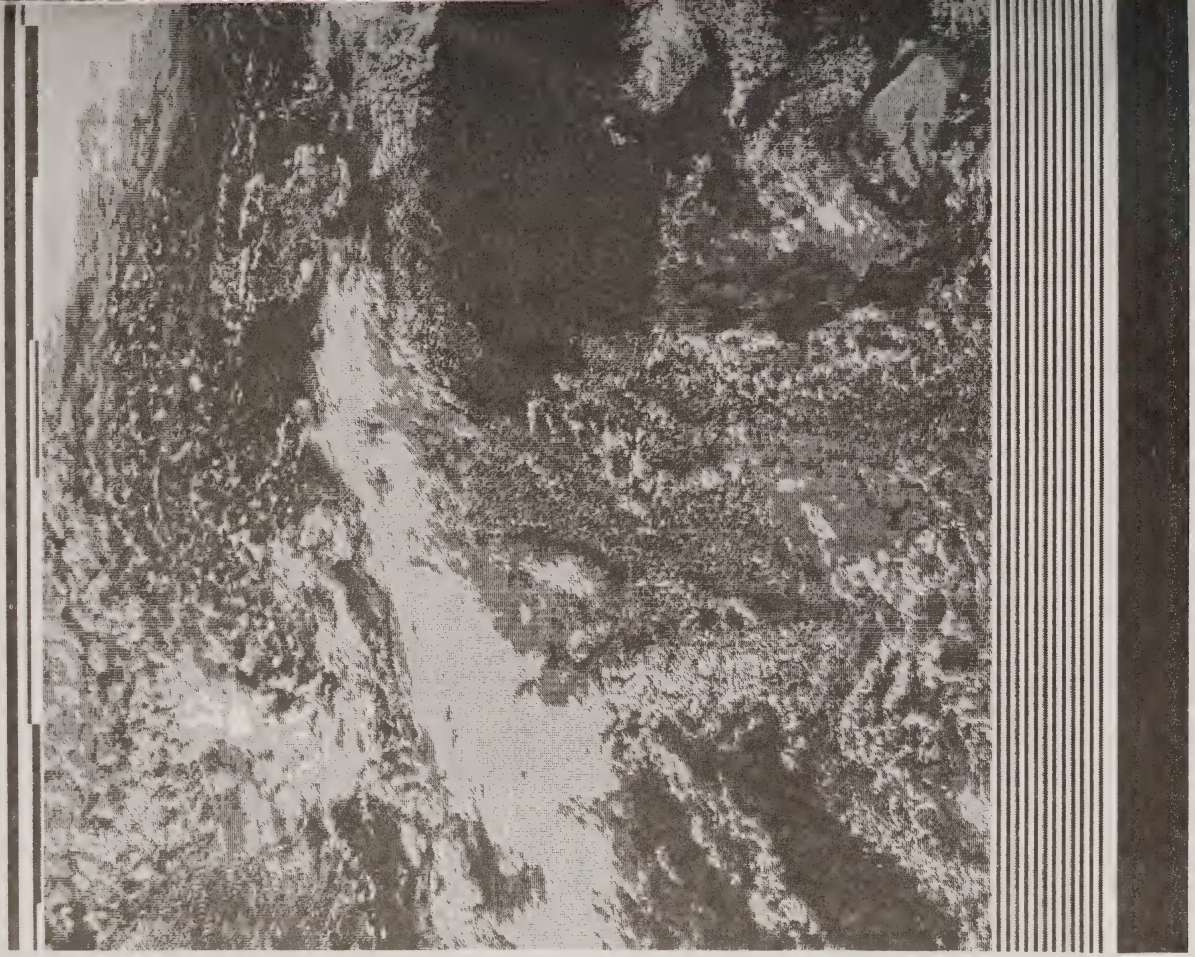


Okean-2, 15 August 1990, 1529-1539 GMT, descending.
The horizontal rate of this spacecraft is 4 lines per second, the height is about 630 Km, consequently the resolution is very high. The first number of each block indicates the minutes elapsed from Moscow midnight. On board the satellite there are several sensors: VIS, IR, radar, etc.



NOAA-10, 7 January 1991, 1711-1725 GMT, HRPT, IR ch 4.
The HRPT system does not correct for the panoramic distortion inherent in scanning the curvature of the earth's surface. For this picture we stored on disk the whole 2048-word line, then we printed only the almost lateral 1200 pixels; thus you will notice some non-linearity along the left edge. Each line is printed once. The index of cooperation is 352. Winter pictures have low dynamics so we burnt the whiter clouds in order to get land/sea contrast.



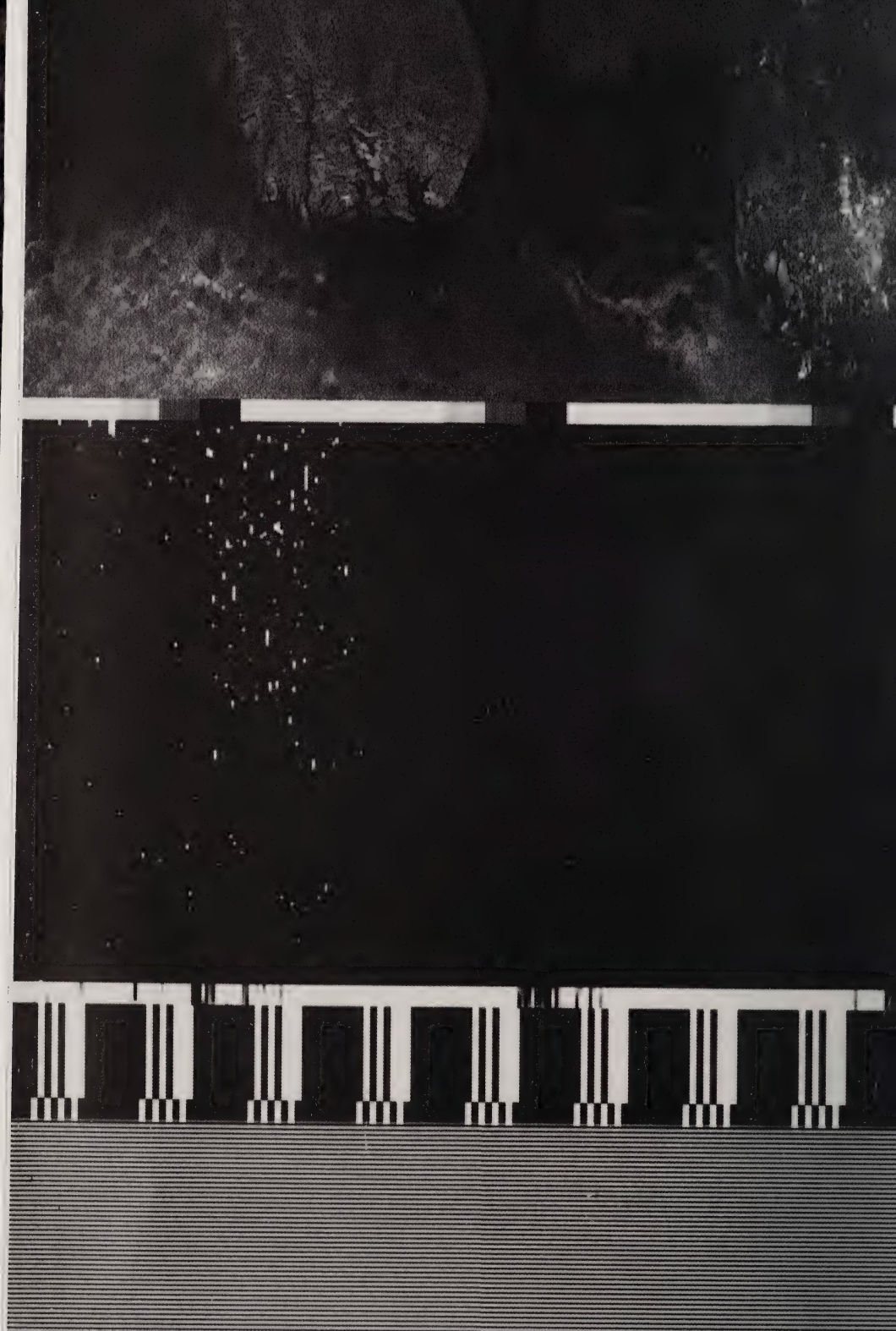


This is an early picture from the new Meteor 3 - 4 received on 30th April 1991.

HP Laser dump by : Timestep Wickhambrook Newmarket CB8 8QA

This is the first official D2 Meteosat 5 image received on 2nd May 1991 at 9-00 GMT.

HP Laser dump by : Timestep, Hickhambrook Newmarket CB8 8QA



Conclusion
Prints prepared from these negatives were most acceptable. One naturally tends to be critical, and close inspection clearly shows the existence of the VDU screen pixels. However, held at arms length, as normal viewing distance, the photographs are more than acceptable. I include prints by way of illustration. I dare say that even better results could be obtained using a multi sync monitor and Mode 21. Has any Rig member had a go at this-it is certainly an interesting project for anyone with such a monitor.

Les included 5 very clear photos which I haven't reproduced but they were so detailed that I could see that his monitor tube was a Trinitron type and not the normal dot matrix type.

This type of technique is also used in photographic copying-- HN.

Wind of change is coming.
The following is a letter that the chairman read in Farming News
Name & address supplied
Sir - I should like to warn your readers of yet more impending legislation about to be passed by the Brussels Bureaucrats. This is a follow-up to the Clean Air Act, 1990 and is entitled The Control of Farmers Flatulence (COFF).
Farmers who in the past have felt able to break wind at will whilst going about their work will now be subject to strict controls. Accurate records will have to be kept detailing all instances of flatulances occurring around the farm, including estimates of volume and aroma, and whether any members of the general public have been put at risk. In serious cases, and I believe growers of Brussels sprouts will fall into this category, it is possible that a meter may have to be fitted offering a partial remedy.
The organic sector, however, will be exempt from legislation because their level of toxicity should fall below those set out in COFF guidelines. For the high percentage of farmers expected to be affected by this act it is felt that relatively minor alteration to diet and daily routine may be sufficient to avoid prosecution. However, farmers feeling a need to air their grievances should do so immediately, but let us all be aware that the wind of change is blowing through the countryside!

The article was dated the beginning of April.

AMIGASAT HISTORY

Geoff Hatto

The Amigasat Project started because my friend Peter Briggs (G7HRB) did a Final year project at university entitled "A Receiver and Decoder for Meteorological Satellites". The project was based around an Atari ST! Peter constructed a Cirkit Weather Satellite receiver and designed a complex hardware interface which plugged into the computer's parallel port. He then developed a program on the ST which allowed image reception and processing. I was fascinated at the thought of receiving weather pictures on a home micro, and wondered whether it would be possible on my own machine, a Commodore Amiga 1000.

Peter's equipment only gave results which were just recognisable as satellite weather pictures. The program was limited by the screen display of the machine, and the quality of the hardware decoder. Proposed enhancements to the hardware could not be carried out in the project time made available. Nevertheless, they WERE satellite images from space! I asked Peter if I could borrow his receiver to listen to the signals as the satellites went by. He told me that I needed a good aerial and a better decoder if I was to achieve any good results. It then became apparent that equipment for weather satellite reception at the time was very expensive, so I decided to improvise a bit! I asked my sister if she had any metal coat hangers to make a satellite aerial out of. She look bemused, but gave me some anyway. After constructing something that resembled a cross dipole, signals were indeed heard!

I don't own an oscilloscope, so I designed a small A/D converter which fitted to the parallel port on the Amiga, and wrote some software which resembled a digital storage oscilloscope. Now I could see the signals Peter was trying to decode. It was not long before I became impatient and wanted to see the images I could hear. My University course contained lectures on digital signal processing, and I wondered whether I could use this knowledge to directly decode the signals entirely in software. Amigasat was born. The first images were rough to say the least, but after several software modifications and revisions very good results were being achieved. All of my initial work was done using a battery powered Walkman to play and record the signal sources. My software had to be powerful enough to cope with background noise and the batteries running down!

It was during the early stage of development that I met Chris Pretty of Martelec Communications. I was in his shop and noticed a Meteosat decoder displaying live images. I asked lots of questions and explained that I had a system to do the same thing on a Commodore Amiga. Chris asked to see my system in action, and so a demonstration was arranged. I think he was a bit shocked to see the results obtainable from just a receiver, a small interface, the decoding software and four metal coat hangers!

Chris asked if Amigasat could be enhanced to a commercial quality product. After months of development, version 1.0 was released. AmigaSat has since undergone two further revisions to add more features and still more are on the way! All of the releases to date have concentrated on ease of use and listening to user feedback. AmigaSat was first launched at the Sandown Park RADIO RALLY, and advertised in the RIG news letter. When Chris suggested promoting AmigaSat in the RIG news letter, I had my doubts. After all, RIG members REALLY know what they're talking about, don't they? Would my package do well? It really has. I now keep a database of RIG member's letters who have bought AmigaSat, and this is enough in itself to spur me on to develop even more powerful versions of the software!

I will be at Sandown Park again this year with Martelec, with the latest AmigaSat release which I am currently working on. No clues as to the specifications here. Some RIG members already know what I'm up to - you'll just have to wait and see!

I would like to take this opportunity to thank all those RIG members who have bought the product and who have written back with such positive comments.

THIS NEWSLETTER'S PICTURES

This time one of the images has been produced by Les Currington from the Soviet satellite Meteor 3-3. It's of Greenland right up to the North Pole and shows a lot of superb detail. Members who say "I can't get that far" should be advised that Les uses a beam aerial to extend his reception area.

The other three are, as described in the captions, by Marciano Righini, I4MY using the system described in this Newsletter.

A POTTED HISTORY OF MARTELEC

Chris Pretty

Remember those early, slim RIG newsletters? Not like the hefty volumes which drop onto our doormats now. Then, Martelec was RIG's first advertiser, offering, amongst other things, a kit of parts for the ubiquitous YU3 UMV framestore, and a kit for the popular MSR20 receiver. Technology, and computing power have moved on apace since then, and of course so have the demands and expectations of you, the user. Not everything has changed for the better though; paging interference has become more widespread, and can only become worse as new pager sites are opened every week. It is rather too easy to be ambivalent to the problem until you yourself become a victim - rather like getting a puncture! Martelec has done much work in receiver design, and trials of a 'pager-proof' receiver will begin soon with the participation of RIG members to verify our own extraordinary results (see Chairman's Waffle). As far as polar reception goes we do not believe there should be any 'no go' areas.

To be announced at Sandown will be a new, compact VHF aerial. Developed from the quadrafilar helix design it offers the user a fully assembled unit, having more consistent angular coverage than the Turnstile (crossed-dipole) design. In recognition of the rights of individuals not to own a computer, we have developed a new framestore based on the design by Dave Woods. This will provide 1024 x 1024 x 256 resolution, with the option to plug-in memory modules for additional image storage. Animation and zoom will be amongst its standard features, and possibly a hard-copy facility also. There was a time, like the wearing of suede shoes in public, when Amiga owners were rather timid about confessing their Commodore allegiances amongst fellow RIG members - not so any more! Since Amigasat they too have enjoyed the benefits of a first-class satellite package. The latest version (V2.0) will be announced at Sandown, where it will be ably demonstrated by Geoff Hatto. This is not the end of the story though, as development continues to expand the features available from Amigasat.

What about HRPT/AVHRR reception? Well, needless to say Martelec is not letting the grass grow under its feet here either; development work is well advanced and we shall be announcing our offering later this year.

NOISE MEASUREMENTS ON PCSAT III SYSTEMS

Mike Goodall

Whilst trying out LNA tests with my Dartcom downconverter I wondered if there was an easy way to compare the percentage noise on stored received pictures, on the Timestep package.The answer was simple. The "POINT" programme supplied with the software, which can be loaded into your Meteosat and Polar directories. This is executed and the appropriate picture file loaded. The pointer is moved around with the mouse and the value of the pixel (between 0 and 255) is displayed under the x and y co-ordinates on the right of the screen. With Meteosat pics the best to try is the TEST page. This has greyscale blocks at the bottom, which, given no noise on the signal, (I should be so lucky), should be of a consistent shade of grey. Move the pointer very slowly over one of the blocks and note the highest and lowest value displayed. Note the difference between the two figures i.e. 156 - 136 = 20. This is then multiplied by 100 and divided by 255 to give an approximate percentage of noise on the picture. A difference in readings of 20 would give a noise percentage of around 7.8%.

Try it on a dark grey and near white for an average. But not on Black or white unless you are sure that your receive levels are not set up so that they limit. On Noaa pics use the dark grey square blocks at the left of the IR image and also the small greyscale steps next to them to get an average. On my Noaa pics with an overhead pass I achieved 1.5% noise! Not much to worry about there. Unfortunately at the time of writing the Meteosat pics on the loop yagi are producing around 7.5% noise. Steps are in hand to improve this. Incidentally, a palette made up of 6 or 8 colours merged-in over the normal black white range shows up any noise which is present on the Meteosat Test page greyscale blocks. While the above noise percentage figures are probably not mathematically nor scientifically accurate they serve as a very useful guide to improving your overall noise figure.

From WATCHFUL WILLIE
Name and address supplied.

I note, with great concern, the effects of inflation on some of your advertisers.

The Timestep "SALE!" insert in RIG 21 can be compared with their "SALE! II" insert in RIG 22. The Meteosat Receivers, of which there were 9 at £149.95, have diminished to 8 at £169.95, a price increase of 13%. The Meteosat Pre-Amplifiers, of which there were 11 priced at £59.95, claiming an approximate noise figure of 1dB, have become 7, priced at £79.95, with a noise figure of approximately 1.5dB. The price increased by 33% and the noise figure by 50%. Stop laughing, this is serious - buy now or the things will be unaffordable by Xmas and audible with the naked ear! Similarly, the Meteosat 55 element Yagi, of which there were 18 at £49.95, evidently sold so well that a serious shortage of noble rings has developed and the remaining 8 have been moved by the market to £89.95, an increase of 80%.

Putting these figures into Willie's Data Engine indicates an interesting marketing trend - the more sold, apparently the more popular the product, so the price increase is greater. Economies of scale may then transfer directly into profit.

On page 42 of RIG 22, in his interesting article on VGA specifications, Dave referred to a "not very creative marketing man". Perhaps his judgment is unusually well informed!

Yours etc.,
Willie
Name and address supplied

WANTED - Framestore David F Pearson G4UFS

WANTED - WORKING FRAMESTORE
Brian Faulkner,Nevasa, Churchtown, Ludgvan, Penzance.
TR20 8HG. 0736740573

The Soviet and Chinese Satellite Scene

Les Currington
15th April 1991

Up to the time of writing this report the Weather Satellite pictures from the Meteors have been most disappointing partly due to the very thick cloud cover and partly due to the infrequent transmissions, during the early part of the year. At one time not a single Meteor was heard on the VHF band for several days. In replying to Les Hamilton's letter in RIG 23 regarding the monitoring of Okean over a long period during 1990, I, in a rash moment mentioned how nice it would be if the Archimedes Programme that he had offered to RIG members would run on the PC. Much to my delight within one week a program for the PC was dropping through my Letter Box. Details of this program have been sent to the secretary and hopefully all information will be included in this RIG

METEOR 3-3 137.3 Mhz

Meteor 3-3 has been switched back on again and is giving good imagery on a mid-morning northbound pass. Very good IR pictures have been seen during the late evening pass after a period of very poor IR pictures during January

METEOR 2-20 137.85 Mhz

Meteor 2-20 is now transmitting on a mid-morning northbound pass. During the beginning of April all phasing bars and greyscale developed faults and were switched off. The picture is still visible to Frame Store users, but not obtainable to computers using software to obtain sync.

FENG YUN 1-B

Most keen viewers of Feng Yun where disappointed to see the loss of signals when the Satellite went into an uncontrollable tumble at the end of last year, especially as the early transmissions looked very promising when the solar conditions improved. However all may not be lost as the Satellite tumble has been reduced from 6.3 seconds on the 7th January to approximately 1 min on the 14th of April so perhaps we may still see the bird brought back to life.

OKEAN 2 137.4 mhz

Frequent transmissions have been seen over the last month or so consisting of some excellent visible pictures, with occasional short runs of radar;several members have reported radar passes over the UK. This is a Satellite that is well worth watching. When it's in a good mood it can give some interesting results

---

FOR SALE: £60.00 o.n.o.

Maplin "Mapsat V.H.F. Satellite Receiver". The receiver is built and working in an instrument case with a mains power supply and has the Maplin silk screened front panel. This would be a good starting point for somebody wishing to receive weather satellites on a low budget. Original bill, construction details and circuit diagrams included.

There is also a Maplin crossed dipole antenna suitable for polar orbiter weather satellite reception included in the price.

See the Maplin catalogue for full details and price.

Buyer collects or pays postage but if I can help with delivery, I will.

Peter Ingram, Watch Cross Farm, Irthington, Carlisle CA6 4NE
Tel: (0228) 73691

FOR SALE

RIG VHF Scanning Receiver Module with LCD Display and LED Channel Number - As New £120 PC SAT III (Timestep) PC Card S/Ware £110. Satfoot (G3RUH) Satellite Prediction S/Ware (original-registered) for BBC. £10. Phone Paul Chamberlain (0293) 515201 (Home) or 081 760 3397 (Business).

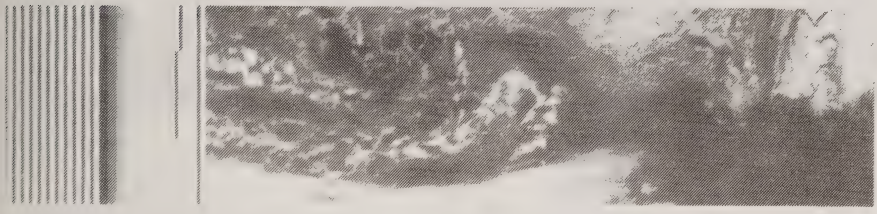
METEOR 2 SERIES WEATHER SATELLITES.

Les Currington, G8LOK

During the early launches of the Meteor Satellites identification was very easy due to the phasing bars varying in number with every launch. It was only necessary to count the bars to make a fairly accurate identification of the Satellite. However during the last few years the number of phasing bars has remained at 14. It has been announced that the Meteor 2 series will end in 1990 so it is possible that Met 2/20 will be the last of the series.

The print shown below is a typical Met 2 series format consisting of Phasing Bars, Grey scale, Binary data and picture.An excellent article on reading the Binary edge code was given in RIG7P19.

Frequency 137.3,137.4 and 137.85Mhz
Resolution 2 km



Meteor 2 IR Channel.

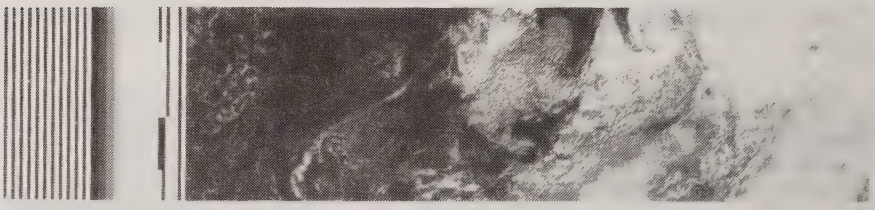
Meteor 2 IR can be easily identified by the very distinct sound of a croaking frog or creaking door and varying shades of grey with an unlockable picture of very poor quality. A modification to the frame store was made in the past but the results were so poor it was not worth the effort.

Meteor 3-series Visible transmissions.

The Meteor 3 series are in a much higher orbit to prevent coverage gaps in the equatorial regions.It has been announced that it is hoped to have at least 2 or three in orbit at any one time, and it is scheduled to put one in orbit each year.

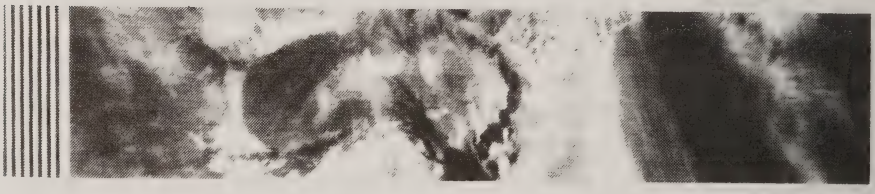
The following are the details of transmissions:-

Carrier Frequency 137.3,137.4, and 137.85 Mhz
Deviation +/- 15khz
Allocated Bandwidth +/- 50Khz
Output power 5 Watts
Subcarrier Frequency 2400 Khz +/- 10%
Subcarrier Modulation up to 90% corresponding to peak white
Line phasing bars 256 Hz modulated to 100%
Length of phasing signal 90-100 Ms
Scanning rate 120 lines/min.
Swath width 2600 km
Resolution 1-2 Km



Meteor 3 IR transmissions

The published details of the IR used on the Meteor 3 series does not correspond to the IR now used on Meteor 3-3 so no details are shown.

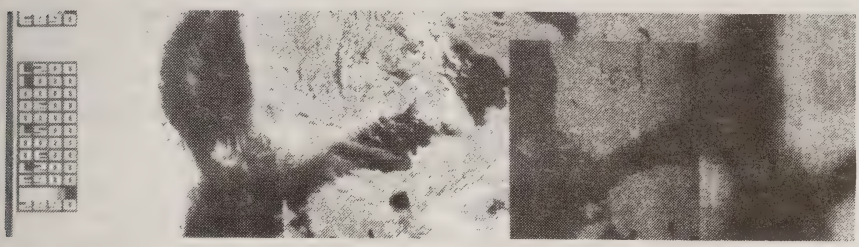


Oceanographic Radar Satellite Okean 2

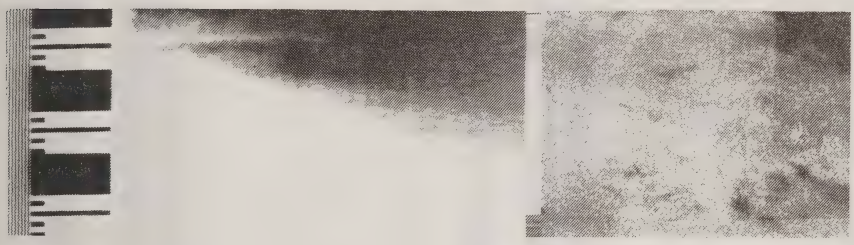
Direct data on VHF: Carrier 137.4 Mhz
Modulation AM/FM
Subcarrier 2400 khz +/-.004
Deviation +/- 9.6 khz
Output 5 watts

SLR Side looking Radar transmissions as follows:-

Low resolution scanner + Side looking Radar + Scanning .8cm Radiometer



Scanning .8cm Radiometer + Side looking Radar



Low resolution scanner

Activity Intercosmos 24 1998 - 80C

Activity was launched to monitor low frequency 9.6khz radio waves into the Magnetosphere and to the triggering of charged particles. Strong signals were reported by Dr Bjortorp in Norway, who I understand was interested in this project, but did not realise that the strong signals he was getting in Norway, were from this bird. The large variation in signal strength was probably due to the elliptical orbit. The signals I received in UK where only just audible but in Norway were causing interference.

Frequency 137.09, 137.44 and 136.68 mHz.
Perigee 507 km Apogee 2491 km.

The picture below was supplied by Dr Bjortorp.

Thanks are due to G Perry OBE and Dr Bjortorp for information supplied

KEPLER ELEMENTS
Provided by Max White - Kettering Group

	NOAA 9	NOAA 10	NOAA 11
	137.62 MHz	137.50 MHz	137.62 MHz
	84-123	86-73	88-89
EPOCH OF DATA	91102.28360107	91 97.93691543	91 99.26633402
ACCELERATION	0.00000955	0.00001129	0.00001228
REV NO.	32621	23655	13074
INCLINATION	99.1729	98.5720	99.0242
R. A. NODE	114.2159	123.9135	53.5690
ECCENTRICITY	0.0014121	0.0014050	0.0012222
ARG OF PERIGEE	248.7678	129.2742	164.8291
MEAN ANOMALY	111.1989	230.9686	195.3252
MEAN MOTION	14.12944064	14.24039231	14.12059942

	MET 2-16	MET 2-17	MET 2-18
	137.85 MHz	137.30 MHz	137.30 MHz
	87-68	88-05	89-18
EPOCH OF DATA	91101.89804429	91101.97922738	91 99.26633402
ACCELERATION	0.00000297	0.00000181	0.00000466
REV NO.	18429	16470	10677
INCLINATION	82.5529	82.5410	82.5245
R. A. NODE	53.5274	112.9383	351.0991
ECCENTRICITY	0.0012595	0.0015594	0.0012668
ARG OF PERIGEE	126.6124	200.6880	250.6466
MEAN ANOMALY	233.6204	159.3653	109.3304
MEAN MOTION	13.83761980	13.84468190	13.84114412

	MET 2-19	MET 2-20	OKEAN 2
	137.85 MHz	137.30 MHz	137.40 MHz
	90-57	90-86	90-18
EPOCH OF DATA	91 97.99738135	91 98.05674273	91 97.99925432
ACCELERATION	0.00000296	0.00000560	0.00005586
REV NO.	3929	2651	5949
INCLINATION	82.5445	82.5323	82.5278
R. A. NODE	54.6394	353.6736	185.9763
ECCENTRICITY	0.0015199	0.0014884	0.0020726
ARG OF PERIGEE	175.3570	73.0832	37.1833
MEAN ANOMALY	184.7737	287.1957	323.0808
MEAN MOTION	13.83937039	13.83324362	14.74681481

	MET 3-2	MET 3-3	FENG YUN 1B
	137.30 MHz	137.85 MHz	137.80 MHz
	88-64	89-86	90-81
EPOCH OF DATA	91 98.88766015	91 97.77461293	91 96.95367471
ACCELERATION	0.00000048	0.00000043	0.00000451
REV NO.	12987	6969	3023
INCLINATION	82.5420	82.5534	98.9462
R. A. NODE	68.2237	10.2239	131.9327
ECCENTRICITY	0.0016200	0.0016199	0.0015324
ARG OF PERIGEE	297.4131	317.8402	18.7930
MEAN ANOMALY	62.5317	42.1537	341.3802
MEAN MOTION	13.16916870	13.15945690	14.01105772

SOVIET & CHINESE REFERENCE ORBITS
Simon Goodall

These are the times of north bound equator crossings (in GMT) and longitudes (in degrees west) for three Russian satellites and Feng Yun 1B. They are given at weekly intervals together with the period and the change in longitude per orbit.

MET 2-20
period 104.09 minutes increment 26.04 degrees

4	MAY	07:29	1	11	MAY	07:52	20	18	MAY	06:31	12	25	MAY	05:09	4
1	JUN	03:48	4	8	JUN	04:11	14	15	JUN	02:49	6	22	JUN	01:27	358
29	JUN	01:50	16	6	JUL	00:28	8	13	JUL	23:25	6	20	JUL	22:02	358
27	JUL	22:25	16	3	AUG	21:03	8	10	AUG	19:59	6	17	AUG	20:03	17

MET 2-17
period 104.00 minutes increment 26.1 degrees

4	MAY	16:08	9	11	MAY	14:38	359	18	MAY	14:53	5	25	MAY	13:23	5
1	JUN	11:54	355	8	JUN	12:08	11	15	JUN	10:39	1	22	JUN	10:54	18
29	JUN	09:24	8	6	JUL	07:54	3	13	JUL	08:09	14	20	JUL	06:39	4
27	JUL	06:54	20	3	AUG	05:24	10	10	AUG	03:55	0	17	AUG	04:09	16

MET 3-3
period 109.41 minutes increment 27.37 degrees

4 MAY 09:15	9	11 MAY 09:07	19	18 MAY 07:10	2	25 MAY 07:03	11
1 JUN 06:56	21	8 JUN 04:58	4	15 JUN 04:51	14	22 JUN 02:54	356
29 JUN 02:48	6	6 JUL 02:39	16	13 JUL 00:42	359	20 JUL 00:34	9
27 JUL 00:27	19	3 AUG 22:14	358	10 AUG 22:06	9	17 AUG 21:59	19

FENG YUN 1B
period 102.87 minutes increment 25.71 degrees

4 MAY 19:17	352	11 MAY 19:15	352	18 MAY 19:12	351	25 MAY 19:09	350
1 JUN 19:06	350	8 JUN 19:03	349	15 JUN 19:01	349	22 JUN 18:58	348
29 JUN 18:55	347	6 JUL 18:52	346	13 JUL 18:49	346	20 JUL 18:46	345
27 JUL 18:43	344	3 AUG 18:39	343	10 AUG 18:36	343	17 AUG 18:33	342

COMING SOON IN THE JUNE ISSUE WILL BE: !!?

Well this large edition has just about cleared everything out of the Newsletter in-tray. We need more input for the next one, so get your word processors (we can accept most types) or pens going. Would you send any articles or contributions to the chairman for the time being. When a new Newsletter Editor is appointed I will forward everything on to them willingly.

- plus predictions et al !!

RIG NEWSLETTER BINDERS

are available from the stand at Rallies for £3-50 each or £10 for 3. They are also available via post from Gordon Fleming for £4-00 each. His address is 168 Blythway, Welwyn Garden City, Herts. AL8 1DU. They will hold approx. 12 of the early Newsletters, but not so many of the thicker recent ones! We have already sold a lot of these and we can only advise you to get them ASAP.

LNA KITS

The HEMT has been updated from 32084 to 32184A. We seem to be on an unending updating cycle. By the time you read this, final details should be complete. Contact the Chairman re price and availability. Constructional details should be in the next Newsletter.

LOCKING RECEIVER

Barry Haines

INTRODUCTION

During a very hot day last summer while taking a sequence of frames from Meteosat I noticed the down converter drifting HF. This was due to the shed where the converter is situated getting very hot. By the end of the day when the shed cooled down I noticed I had lost two frames, I had to tune about 35 KHz down to find the signal.

During the last couple of months I have been investigating methods to overcome this problem. I finally decided on first using a crystal controlled receiver to convert to 46 MHz and then a receiver to lock on and track the signal. The reason for first converting to 46 MHz was so I could combine the meteosat signal with the orbital satellites signal on 137 MHz and use a common feed to the house.

137/46 MHz CONVERTER

This consists of a crystal oscillator at 91 MHz feeding a mosfet mixer at gate 2 and the 137 MHz IF before being passively combined to the feeder. Note if you are not using a long feed or the signals are strong you probably can omit this amplifier.

TRACKING RECEIVER

The signal is a feed into a self oscillating voltage controlled fet mixer. The 10.7 MHz IF is passed via a ceramic roofing filter to a second fet amplifier. The pass band is determined by a combination of two 50 KHz and one 150 KHz ceramic filters before going to the FM IC. The FM IC provides AFC to lock the receiver to the signal and the recovered video output passes through the op amp band pass filter. I use a small 1 watt af amplifier to monitor the signal. The second op amp in the package is used to drive a tuning meter from the AFC line. The meters balance is set by a pot across the supply.

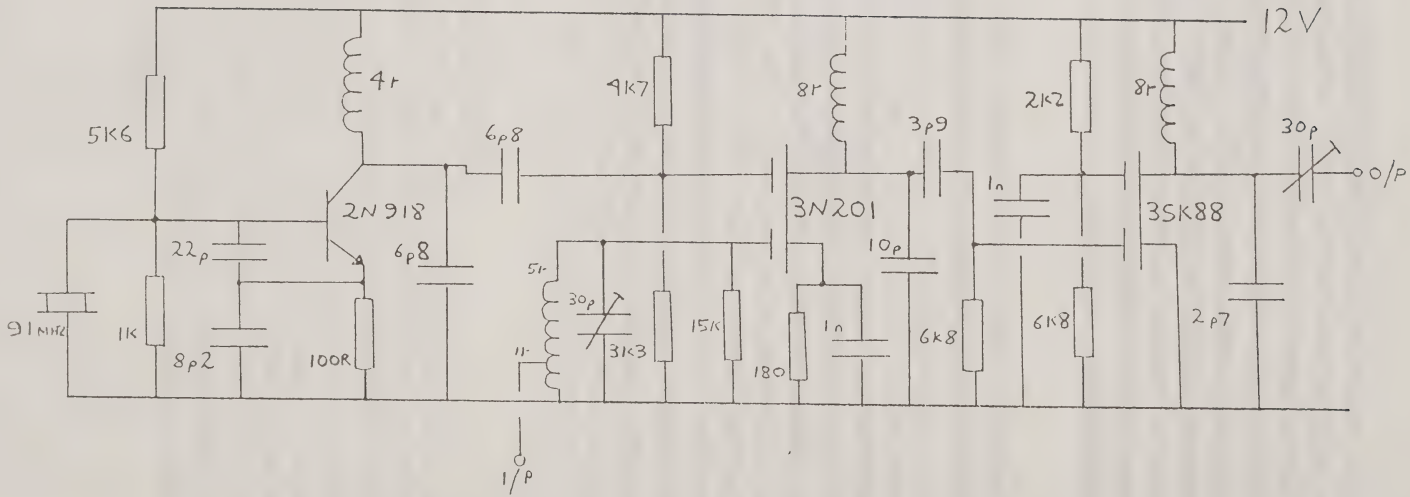
SETTING UP

Basically its just tune for maximum smoke although the best way to set the quadrature coil is to tune for maximum noise under no signal conditions. You may have to change the values in the meter circuit to suit your particular meter as the one I used bought for 20p at a rally and have no idea of its sensitivity. To set the meter I would find the two extremes of lock set to the middle and adjust the pot for mid position. I would recommend a sequence of adjusting the tuning and disconnecting the reconnecting the signal to determine the capture range.

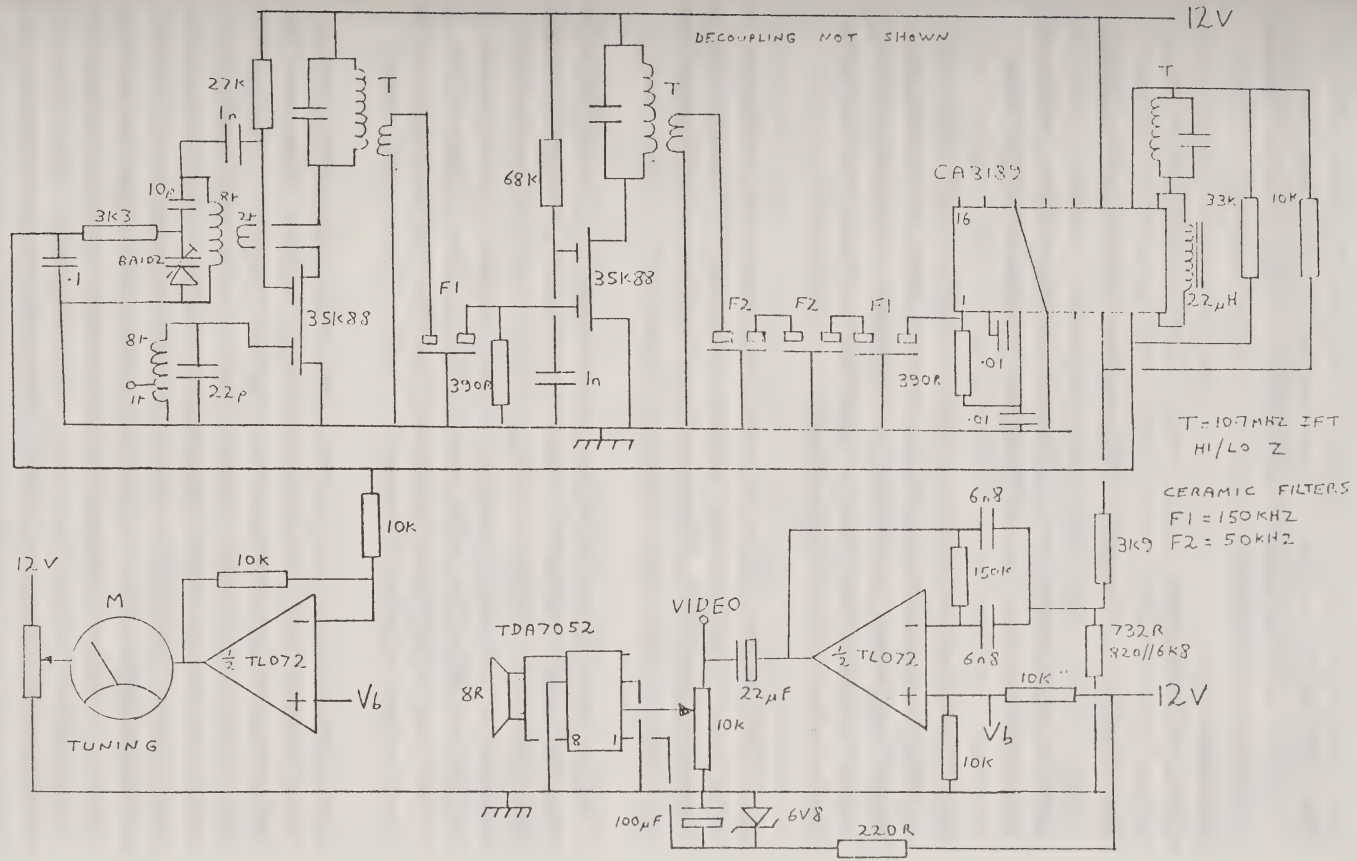
COMMENTS

As the VCO operates around 57MHz the receiver will drift a bit for the first hour, so you will have to make a few adjustments until it's warmed up.

Although I used a 91MHz xtal, there is no reason why you cannot use any xtal in the range 90-120MHz. If you have to buy a xtal I would recommend a 116MHz converter xtal as this would be off the shelf and cheaper than made to order ones. If you do use a different xtal, then the tuned circuits will have to be changed. I have given the values purely as a guide, you can use different formers to the ones that I have. I have also left out the course tuning, but I have used a second vari-cap . You can use any method that is convenient.



137/46MHZ CONVERTER



LOCKING RECEIVER

SAT TRACK:
A SOPHISTICATED ANTENNA TRACKING SYSTEM

by Roland Iten HB9BOM,
Zimmelstr. 3,
CH-6314 Unteraegeri

SAT TRACK is a completely self contained satellite tracking system. It has a built in microprocessor with the firmware in a 27128 EPROM, 8KB RAM which is buffered by a lithium battery, so that the data will not be lost. The real time clock also has a built in battery.

SAT TRACK works with most types of rotors (KENPRO, CDE, YAESU). Some rotor control boxes require a little modification, especially those types which are not already set up for automatic remote control. Everything is described very well in the manual. Typical antenna pointing accuracy is +/- 3 degrees.

SAT TRACK eliminates the need for a computer, software or interfaces. Setup is very simple and straight forward due to extensive use of menus. The user is guided through all instructions and does not need to be computer illiterate.

Only for setup, you need a computer or terminal. With **SAT TRACK** you get a disk (MS DOS). This disc contains a program called SATTRACK EXE. With this program you can up-date the Kepler Elements. It does not matter if the Keplerian Elements are in AMSAT or NASA format. You can find those Elements on your local BBS. If you do not have a computer, you also can use a terminal to up-date the Keplerian elements.

SAT TRACK will track any earth orbiting body. The satellites may be circular or elliptic. For example amateur radio satellites, weather satellite or the space shuttle are typical objects for tracking. After the setup data has been entered, the computer or terminal can be disconnected. A satellite select switch on the front panel allows you to select which of the 12 programmed satellites will be tracked. A Status LED informs the user if the selected satellite is above the horizon. An alarm switch can be activated so that a buzzer will ring if the satellite is above the horizon. A tracking switch allows the user to disable the tracking and he can control the antennas by the rotor control unit. All tracking dates are still displayed.

The front panel contains a LCD Display on which the following data will be displayed and updated every 6 seconds: Satellite name, azimuth, elevation, MA or message from the system.
If the computer or terminal is on, however, the following data will be displayed and updated every 6 seconds on the screen: Satellite name, azimuth and elevation antenna angle, height of the satellite above the earth, subsatellite latitude and longitude of the satellite, MA Doppler shift and the current time.

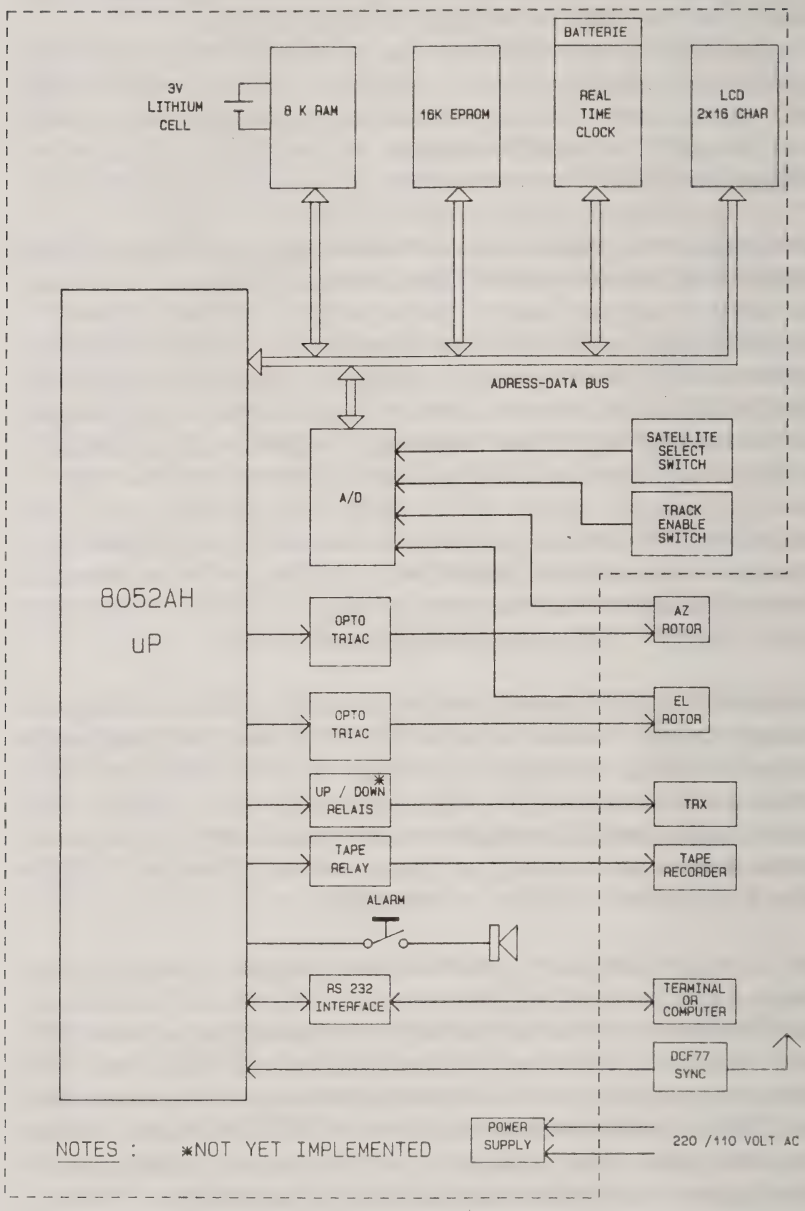
On the rear panel you will find the following in or outputs: A relay contact which is closed when the satellite is above the horizon. That contact may be used to control a tape recorder, receiver or some other device. The user can record telemetry from a amateur satellite or APT pictures from a weather satellite. An input for an DCF 77 clock module which you can get as an option. This will synchronise that internal real time clock every hour. An output to fix the Doppler shift on the receiver. Most of the modern transceivers have this feature built in. A TTL output for rotators which are designed for remote control like the KR5400A or KR5600A. A connector for the azimuth rotator and a connector for the elevation rotator. A connector for the mains supply. A DB-25 connector to connect the SAT TRACK to a computer or terminal.

The rotator motors are switched on and off by Triac's using zero crossing optically isolated control. This eliminates the interference to receivers that is caused by contact switches or relays. The rotator control algorithm has a special test build in that continuously checks for rotator movements. If a rotator does not move when commanded, it will be turned off. This protects the rotator if the system is stalled or overloaded.

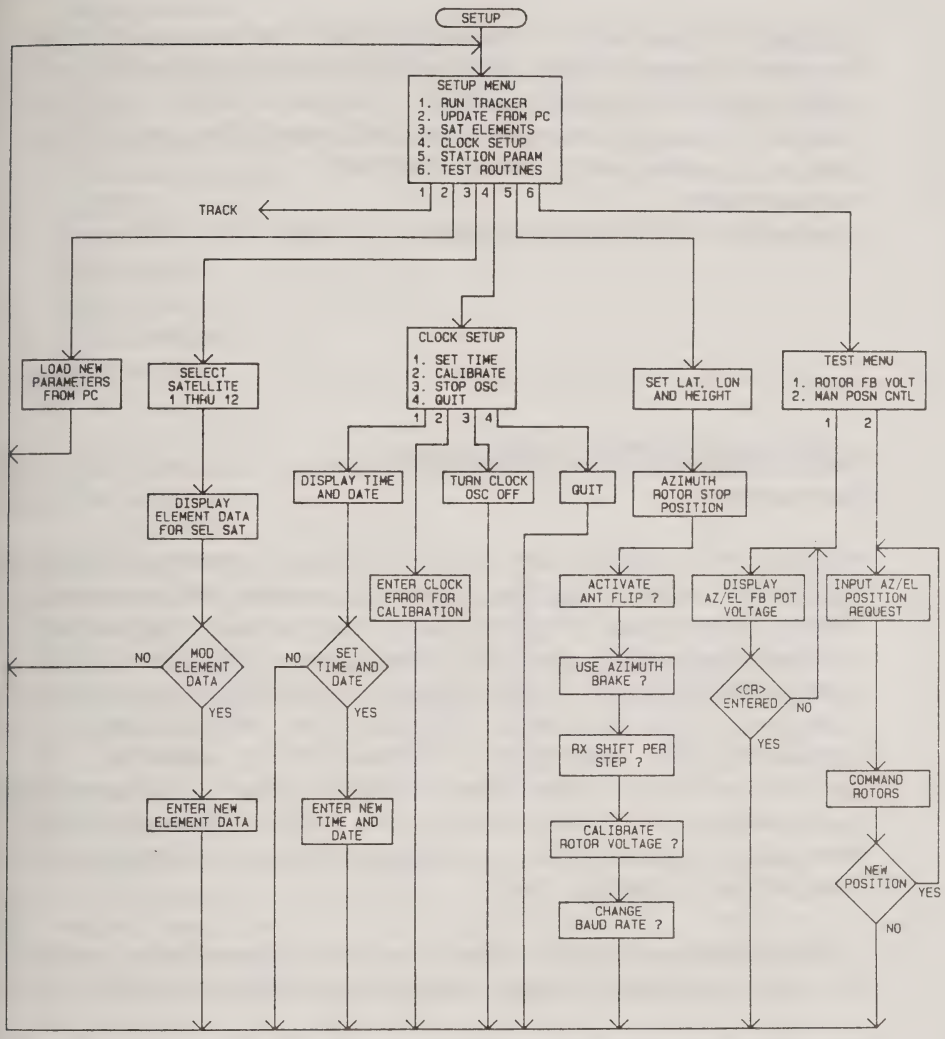
When using an elevation rotator with 180 degrees rotation and an antenna system that allows movement over that range, an algorithm is used to avoid the azimuth stop during a pass. This works by flipping the antenna upside down when required. This feature may be disabled for antenna systems which have a limited travel. This is only a part of the features of SAT TRACK, but I think it is the best system that is designed for the amateur market. See the block diagram for a better understanding of the system.

If you are interested in **SAT TRACK** and want to get further information contact me at the above address.

SATELLITE TRACKING SYSTEM



SATELLITE TRACKING SYSTEM



SATELLITE TRACKING

Program in GWbasic from Gordon Train

Gordon Train has sent in a tracking program that runs in GWbasic. If a colourful map is desired then an EGA monitor is required. It will cover up to 20 different satellites. The system is menu driven. Gordon will supply a copy to interested users if they send him a disk, return postage and packing materials.
His address is :-
Gordon Train, 52 St John Str. Keswick, Cumbria. CA12 5AB.

AOS PREDICTION PROGRAM

Les Hamilton

PD-Predict V 1.06 (February 1991) has been developed under the MS-DOS emulator on the Acorn Archimedes Microcomputer. It is supplied on an MD-DOS disc, with "BASIC", and should autoload on booting the disc. Alternatively, it may be RUN by typing "BASIC PREDICT" followed by the <ENTER> key from the operating system prompt. The program has facilities for generating AOS predictions for Polar Orbiting Satellites, and can also create and update a file of keplerian elements for up to 20 such satellites. This file is held on the disc as "Elements.DAT". Hard copy is generated in a format suitable for Epson and compatible dot-matrix printers.

The program is run from a menu screen which gives the options to (1) select a satellite (2) update keplerian elements and (3) EXIT.

Apparition times for polar orbiting satellites are calculated, and a five-column print-out (hard copy) of all passes which come within 5 degrees of the U.K. can be generated. This generally includes a set of three (sometimes only two) ascending and descending passes per satellite every 24 hours.

RUNNING THE PROGRAM

The keplerian elements and additional data used by the program are held in the file "Elements" in the root directory, and are

Satellite name
Designation
Transmitting frequency
Epoch
Acceleration (drag)
Revolution number
Inclination
R.A.A.N.
Eccentricity
Arg. of Perigee
Mean Anomaly
Mean Motion

This is the same order as they are listed in RIG, to make updating as easy as possible.

GENERATING PREDICTIONS

If the Kepler element file has not been generated (the first time you use the program with a blank, formatted disc in your disc-drive), you will first be asked to enter a set of keplerian elements. [See later]. The file will automatically be created, and you will be taken into the main menu.

MAIN MENU

1. RUN PREDICTIONS

This leads to a list of the satellites on file. Input the appropriate number, followed by the <enter> key to select a satellite, or the <enter> key alone to return to the main menu. Having selected a satellite, you are first presented with a table of the keplerian elements, plus semi-major axis and mean altitude.

The two-item menu allows you to select

1. Calculate predictions (you may have to wait 10-20 seconds)
2. Return to main menu

Having opted to calculate predictions, enter the month, day and number of months for printout, then select screen or printer display.

WARNING

There is no check that the printer is on-line. Make sure that it is, or the program may 'hang up' indefinitely !

2. EDIT KEPLERS

This menu has five options:

1. Edit Elements

   First, select your satellite. The keplerian elements are listed, and you may now input the altered value of each item in turn on a dotted line to the right of the existing entry. The length of the dotted line shows the maximum length of the input.

   If a new entry is made, press <enter>, and it becomes the new value. If you press the <enter> key alone, without typing in anything, the original entry is retained.

   Do this for each keplerian element in turn. When complete, you are presented with a "SAVE Y/N" check - pressing the "Y" key updates the disc file with the edited keplers while "N" leaves them unaltered. If no alterations have been made at all, this feature is withheld.

2. Add a new Satellite

   Almost identical to the previous item, except that there are no existing values for comparison. Entering <enter> alone as the satellite name returns you to the Edit Screen.

3. Delete a Satellite

   Select your satellite, then respond to the Y/N check.

4. Re-order Data File.

   New satellites are added to the end of the datafile. This option allows you to reposition them so that, for example, all NOAAs can be grouped sequentially.

   All these submenus may be quitted by pressing the <Enter> key alone.

LATITUDE CORRECTION

In order to produce times of A.O.S. {Acquisition Of Signal} for satellites, a time increment must be added to the calculated equatorial crossing time. This is the program variable 'EX'. For my latitude in Aberdeen, this is assigned the value 7 (minutes) in program line 1580 for northbound satellites, and the value 28 (minutes) in program line 1590 for southbound satellites (the latter measured from the satellite's northbound eqx on the other side of Earth). In the south of England these values would change to 5 minutes and 29 minutes respectively. You may wish to alter my values for your own part of the country.

PREDICT

Takes into account the drag factor, and, as a result, predictions can be very good indeed. For satellites with particularly low drag coefficients, predictions can be in error by no more than 1 minute using Kepler elements three months old ! For the NOAAs, errors are generally of the order of 5 minutes after three months.

Predictions as calculated are excellent for overhead passes. For more distant satellite passes, they will seem a few minutes 'early'. This is simply related to the fact that the satellite footprint is merely 'grazing' the UK, and the entire pass was not being received. If you have any queries or problems, please don't hesitate to get in touch. I am also open to any suggestions for improving the program, or adding extra facilities.

Les Hamilton
8 Deeside Place
Aberdeen AB1 7PW
Tel (0224) 313179
February 1991

I have a few of these disks available. Contact the Chairman.

LAYMAN'S GUIDE TO SATELLITE TERMINOLOGY

James Brown

1 General

Chairman's Waffle: As prescribed by leading experts on the dietary requirements of RIGleys. To be taken while hot, usually accompanied by blowing large raspberries.

Grip-dip meter: A device installed by the electricity board to monitor the inexplicable effect in Sutton St James, noticed when Henry switches on all his equipment simultaneously.

Dissemination schedule: Approximate times when you might expect to get your next edition of RIG, accurate to + or - 200%.

Null-point: half-way between two issues of RIG>

Paging Filter: The ability to ignore the wife's pleas that you come NOW, because the meal's getting cold.

Feed horn: New device, superseding the paging filter, to allow you to eat whilst continuing to work on your latest project.

HRPT: The noise made by the wife's swift intake of breath on discovering how much a high resolution system is going to cost.

Sub-carrier: The treasurer's bag.

Sync-board: What you drain your empty mugs on.

Semi-conductor: A badly etched PCB.

2 ORBIT PREDICTIONS

Argument of perigee: Heated discussion between two RIG members as to who heard what satellite first.

Inclination: The tendency of your aerial to sag.

Mean motion; What happens to a badly secured aerial in high wind.

Acceleration: What happens when the clamps finally give way.

Mean anomaly: The place where the aerial used to be.

Frequency; The number of times this has happened.

Drag factor: The extent to which neighbours dislike your aerial in their flower-bed.

Eccentricity: The degree to which satellites dominate your life.

Rev No: The authors help-line for people trying to kick the addiction.

Perhaps readers would like to contribute further helpful explanations!

PROFILE OF A WX APT RECEIVING STATION.

Andrew McGuffie

The VHF APT receiving system is fairly conventional and consists of the following:-

1. ANTENNA

A Tonna 9-element crossed yagi phased for LH circular polarisation is fitted at one end of a 9 foot horizontal boom and a J-Beam 10-element crossed Yagi phased for RH circular polarisation is at the other end. This is fully steerable in both azimuth and elevation with a choice of either manual or computer control. The Auto tracking system is the one by G4GPQ which appeared in the AMSAT-UK OSCAR NEWS. To enable uninterrupted tracking of satellites passing through the station meridian to the North, where there is a stop on the azimuth rotator, the antenna system is used with 180 degs. shift and the reciprocal AZ/EL is used. An alteration to the software allows the choice of normal or reciprocal tracking to be carried out automatically. Another alteration to the software allows a print-out of the sub-satellite track together with Satellite Name, Date, Orbit No., and GMT and Long. at EQX. The tracking system is also compatible with the AMSAT-UK SATFOOT program.

2. VHF RECEIVERS:

Two RIG rx's are in use. One has thumb-wheel selection of frequency and the other has the normal electronic scan. The video signal is available, through a switching unit, to the YU3UMV scan

Converter, the tape recorder and the photo-fax machine. Normally, the photographic pictures are processed from tape to tape but can be 'off-air' if desired. The switching unit also switches the play-back from the tape recorders to the Scan Converter and the photo-fax machine.

3. 2400Hz OSCILLATOR.

This is required to cater for the 120 lines per minute Meteor Sats. and is contained within a temperature controlled oven. The frequency is set precisely by using the Rugby 60KHZ transmission. this master oscillator is modulated with a DAY OF THE YEAR and TIME CODE from a TIME CODE Generator by GM3TGG and recorded on one track of the tape recorder. The time and day-of-the-year is monitored on play-back on an LED display which enables one to select the part of the pass desired when making photographic prints on the photo-fax unit.

4. METEOSAT.

A 1.2 metre dish with circular radiator to the design which appeared in VHF Communications was constructed. This feeds a Microwave Modules 1691 Pre-amp, a Microwave Modules 1692/137.5 MHz, 2-channel converter and hence into the VHF Rx., recorder and display unit.

5. PHOTOGRAPHIC FAX UNIT.

The photographic drum unit was developed from a Muirhead type D-901-D/S Transmitter. The D-901 was completely stripped of everything except the drum, drum drive motor and the traverse leadscrew. A stepper Motor is fitted to the leadscrew on place of the direct drive from the drum and a three-speed control fitted to obtain the correct aspect ratio for the NOAA Vis./IR side by side. The NOAA alternative-scan, the Meteor 120 lines per minute, the Meteor 240 lines per minute and Meteosat. A Glow Modulator (Crater Tube) and a lens system is fitted to the leadscrew platform. This, when modulated by the video signal, exposes the photographic paper or negative film which is wrapped round the rotating drum. The normal developing and fixing procedures follow. The signal from the rx. or tape is processed in a video unit comprising a Rack with plug-in boards. The output from this unit is the signal that modulates the Glow Modulator tube.

A Telequipment D61a Double Beam Oscilloscope, triggered by the Drum Pulse, provides line by line monitoring of the video signal (crater tube current) and enables precise edge synchronisation to be achieved when in Manual Phasing Mode.

6. SCAN CONVERTER.

The YU3UMV Scan Converter was built using the kit available from VHF Communications in Germany. This was well before a similar kit was available from RIG. This unit is also used for displaying the weather pictures on play-back from tape and to monitor the picture being produced on the photo-fax machine. A signal inverter was wired in using unused gates on the PCB and can be switched on to enable the infra-red signal on the Meteor-3 series to be viewed (white=cold, black=warm) as is normal on NOAA and Meteosat.

7. STATION CLOCK.

This was built by GM3TGG from an article that appeared in THE ELECTOR MAGAZINE in September, 1982. It has its own internal microprocessor system and is updated and checked for accuracy by the Rugby MSF Transmissions on 60KHz. This clock's main advantage is that it maintains the correct time if data from MSF is lost or corrupted for any reason. The DATE is also received on this transmission and displayed.

The Computer is the BBC-B. In addition to Auto Antenna Tracking it is used to process all the orbital information and produce Prediction Calendars for the American NOAA Satellites, the Russian Meteor and Cosmos Satellites, the Chinese Satellite and the Amateur Satellites. With the addition of a WORDWISE Chip it also doubles as a Word Processor.

I also know that Drew has a PCSAT3 now - Henry.

EXTENDING YOUR RANGE FOR POLAR ORBITERS
John Tellick

One of my hobbies as a teenager down on the Sussex coast was long distance TV reception or DXTV. That was back in the good old days of Band 1 and 3, 405 line transmission. Indeed DXTV was more of a problem to most people during the summer since trying to watch BBC on Band 1 at times was almost impossible due to 'continental interference'. This of course was great for me, out comes the tweaker, wind up the line rate and voila, French TV in glorious 819 lines. Much to the annoyance of my parents.

French TV was easy since in those days the UK and France both used positive video modulation. My parents drew the line at taking the set to bits in order to reverse the video detector so as to resolve all the other goodies, 625 lines from Russia to Portugal. I had to purchase a second hand set for my tweaking. That is where it all started. Band 1 and 3 extended to 4 and 5 and that held my interest for many years and still does. But I wanted more and in 1980 I got into satellite TV using the C Band. Moscow TV 24 hours a day, well a very pretty test card for several hours, noise free. By sweeping the Geostationary Arc one could find dozens of interesting signals from many satellites albeit some very weak. This then led on to the explosion of TV feeds now available in the ku band.

I was again beginning to get bored when I asked a friend who developed satellite TV receivers if it was possible to receive weather pictures. He put me in touch with a firm who sold a complete package which I purchased, at an enormous cost and so began the latest chapter in my hobby.

What I hear you ask has all this to do with extending usable signals?

Well, Henry is allowed to waffle on a bit so why not us mere mortals. It may also be that some of you followed my path to Weather Satellites. But I have always striven for more distant signals hence the point of this article. It is of course interesting to see the UK and Central Europe from NOAA and others but I am very interested in the Sahara and Greenland. Having noted that with the usually vertically mounted crossed dipole antenna for Polar Orbiters some signal is available almost from the theoretical AOS point to almost

the LOS point I wondered what results one would obtain actually pointing a crossed dipoles array at the satellites. I have a south facing upstairs window with a clear view to the south so a second J Beam 137 crossed dipole and reflector antenna was purchased. In those days I used an AMSAT UK Polar Projection Map and Plotter to fix the direction of the satellite, still do as a matter of fact, very useful provided you have an ACCURATE equator crossing time. Off upstairs knowing that NOAA was coming up due south. Hang out of window holding antenna horizontal. At theoretical AOS up came the signal and after a few seconds of noise the signal became steady and began to increase in strength. Fantastic, a clean pass all the way up and overhead, tilting the antenna of course when the satellite was over head. Next day I tried one of those fairly east passes again success, noise free all the way round that I was able to track. It was a year or more before I got up on the roof and mounted the horizontal properly and on a rotator giving 360 deg, nearby obstruction free visibility. It was during this time that Pagers reared their ugly voices. I should point out that I now live in deepest built-up suburbia and am surrounded on three sides by paging transmitters, one fortunately only a small installation about a 1/4 mile away which does not appear to interfere and two large installations about 2 miles and 3 miles away, the one to the North West of me being the worst alas. I mention this since a horizontally mounted antenna will pick up more ground based interference including motor bikes in the next street as well as every local electric drill, washing machine, central heating thermostat etc. etc. Rather than a vertical I use the horizontal for all AOS and LOS signals and when the pass is very East or very West switching to the vertically mounted antenna when the satellite is more than about 50 deg. elevation. Then I can rotate the horizontal and switch back to it to pick up the lower elevations as the satellite passes to the North or South. Obviously if it is a distant East or West pass and the elevation won't go above 50 deg. one can track the satellite all the way round from AOS to LOS with the horizontal. The AMSAT UK Polar Projection Map and Plotter will tell you when and where the satellite is on every pass and where to point your antenna. To switch between antennas , or should it be antennae, I simply use a double pole double throw slider switch which seems to be instantaneous break and make so that it does not affect the signal. I connected both the down lead screen and the RX feed screen together, one inner to one pole of the switch the other antenna inner lead to the other pole and RX feed inner to the centre of course. I bridged the poles making the switch a single pole

double throw with two wipers. I thought it would help with a quick break and make. I'm sure that this is not very good RF practice but it seems to work. IF anyone has other ideas for antenna switching I would be pleased to hear them. After the antenna switch I use a pre-amp beside the RX giving about 8 db gain. Probably not good RF practice but if just lifts very weak signals that important bit. Mounted at the antenna just brings up the Pagers! So what can I get? Well on a good day - here come the excuses - pagers, motor bikes, drills etc. allowing, not to mention tropospheric disturbances, something we do not hear much about maybe someone would like to write an article about it since signals from the North sometimes vary wildly. With NOAAs I can obtain images: To the North East the Obskaja Guba inlet to the Kara Sea East of Novaja Zemla. To the East of the Urals and part of the Caspian Sea. To the South East all of Turkey, the whole of Cyprus, Middle East Coast to Lebanon, North Africa coast as far east as Matruh-Alexandria. To the South into the Sahara as far as Southern Algeria, North African coast to mid Spanish Sahara and way out into the Atlantic. To the North West the whole of Newfoundland and part of Labrador Coast and half of Greenland. Reception of Meteors this way extends ones horizons even further with images from the North Pole, the whole of Greenland - fantastic in early summer as the pack ice breaks up and icebergs drift away - down to Mali, Niger and Chad in Africa and Sinai and top of Red Sea.

If you have not tried this approach and are able to mount an antenna horizontally why not try it, I think you will be quite surprised with the results. Mind you I will be very interested to try Timesteps Quadrifilar Helix Antenna 'available soon'.

In the meantime if anyone writes in saying I can get all that on my bog standard vertically mounted crossed dipole noise free, no fades, then you must live on the top of a Welsh mountain or in the middle of the Fens.

DECODING THE SLOW-SCAN IR TRANSMISSIONS OF METEOR 2-16

Les Hamilton

Way back in RIG16 (March 1989), Les Currington noted that Meteor 2-18 (sic) was transmitting 20 lpm IR pictures during the hours of darkness. Although I have yet to observe this phenomenon from Met 218, I have done so on occasions from meteor 2-16, firstly in the final quarter of 1989, and more recently, since November 15 1990. The transmissions have continued unabated for six weeks since, until December 28, when the satellites switched off (possible to make way for Met 2-19, which seems to have taken over on 137.85MHz).

At the end of 1989, when I was still using the Martelec MSR20/BBC Master system to decode satellite images, there was no way that I could cope with this new signal, so much so that I did not even bother to save any recordings on audio tape. However, in mid December 1989 I acquired an Archimedes Microcomputer and Spacetech Weather Satellite Podule. You can gauge my enthusiasm from the fact that I bought the podule first! This system allows the user to decode any weather satellite format in real time.

On November 15 1990, at 16.43 GMT, quite by chance while idly scanning the frequencies, I heard the familiar slow-scan tone again, and promptly made a recording. One November 18 (08.42 GMT) Meteor 2-16 was again heard, firstly in normal mode, transmitting a visible image; after a few minutes, as ground illumination beneath the northbound satellite decreased, it switched instantaneously to slow-scan IR.

My problem now was 'how do I decode this signal'?.

I checked the timing over several minutes with a stopwatch to make sure that the signal was precisely 20 lines per minute, which it was. Put another way, this means one line every three seconds. With the AM sub-carrier at 2400Hz, this suggested 3x2400 = 7200 bits of information per image line. (Normal Meteor at 2 lines per second has 1200).

The 'SPACETECH' podule allows the user to define 'setup' files within which parameters relating to a given satellite are stored and used in decoding. These naturally include the toneburst frequency (256 Hz) and number of pixels per line, so I started on the basis of 7200 pixels, and defined a new 'setup' file by correlation with the toneburst image produced when decoding the slow-scan signal. (The toneburst produced a pattern of 30 black and grey vertical lines - about double that normally produced by Meteors).

With a few minor adjustments to the image framing parameters, a usable 'setup' file was produced, and an image decoded.

THE SLOW-SCAN IMAGE

This procedure definitely does produce images, but the quality is very poor. Particularly, the range of shades actually making up the image is very small (nowhere near the range shown on the grey-scale strip). Colours are reversed as is usual with Russian IR, so an inverted grey-scale must be applied to make the image show up properly.

About all that can be picked out are the major cloud zones. The image is, however, accompanied by two broad grey-scale bands, one to either side of it, which do show a full range of shades.

One thought that occurred to me was that the poor quality might be due to the fact that 7200 image pixels were being mapped on to only 600 screen pixels on the monitor screen. However, adjustment of the 'pixel grab' in the setup file to 1200 (normal Meteor) produced no improvement.

It would be interesting to hear from other RIG members who may have experimented with the decoding of these transmissions. Presumably it should be possible to obtain much increased horizontal resolution from these transmissions, but does anyone know how?

AUTOMATIC RECORDING OF WEATHER SATELLITES IMAGES WITH A **DAT** RECORDER

By Stephen Padar

Unfortunately the second half of this article was omitted in the last Newsletter. Here should be the complete text.

It is well known that weather satellite images can be recorded on audio tape and later played back to yield images almost like images recorded directly from the receiver. This is a great convenience since most of us have to work and cannot be at home to start and stop the equipment. Fortunately, it is fairly easy to make unattended recordings. The Dartcom receiver has a built-in relay that is closed when the squelch opens. This can be used to start a tape recorder. When the squelch closes, the relay opens and the recorder stops. The telemetry data is recorded on one track of the audio tape and a 2400 Hz synch tone is recorded on the adjacent track. When the recording is played back, the telemetry data and synch track are locked together because they are physically on adjacent portions of the tape. Thus, any variation of the tape speed is cancelled out and a slight jitter is present which causes a minute saw-tooth like distortion at the edges of the image. There are also horizontal streaks in all the pictures caused by particles of the tape coming loose and adhering to the tape-head. This problem has been discussed previously in this publication. I believe that I have found a solution to this problem. The solution is DAT. DAT is Digital Audio Tape. A DAT recorder digitises the sound and has even better fidelity than CD recordings. I am using a SONY 55ES DAT recorder. It has a stereo line input and output, but I use only one of the stereo tracks. A 2400 sync tone is not needed. The audio output of the Dartcom receiver is input directly to the fax converter which in turn inputs the signal to the computer. No amplification of the signal is needed going into or out of the DAT recorder.

The recorder has a timer mode so that when it is connected to a timer the recorder starts recording automatically when the timer turns on. Instead of the timer, I am using a home-built relay to turn the recorder on. The tape recorder relay of the Dartcom receiver closes a relay which then turns on the DAT recorder, which immediately goes into the recording mode. when the relay opens the power to the recorder is shut off and it stops. This can be repeated many times during the day or night. When the DAT tape is played back an excellent image is recorded which is indistinguishable from an image recorded directly from the receiver.

MEMBERS LETTERS

I am a new comer to the gentle art of imaging, persuading NOAA pictures onto the screen of my BBC computer, and viewing the eight shades of grey through half closed eyes to soften the rather chunky pixels of Mode 2. I do not know how well known it is that by a little adjustment to the software, such a screen picture, although viewed in eight shades, can actually carry information of sixteen shades of grey which may then be subsequently viewed instantaneously in any combination of eight taken from sixteen. This may need some explanation! I will assume for the moment that the picture is being viewed in monochrome, but the same argument follows for a colour display.

Firstly, we must get the black to white range of signal amplitude split into 16 levels instead of 8. The analogue to digital converter supplies 256 levels which is divided by 32 in the software to output 8 levels. If this division is changed to 16 we will get the required 16 levels of grey shading.

In mode 2, colours 0 to 7 are eight steady colours which in monochrome can represent eight shades of grey, from black to white. The colours 8 to 15 are normally flashing colours, but may be re defined into steady colours by using the appropriate VDU 19 instructions. If the following lines are run before a picture is built up:

```
VDU 19,0,0;0;
VDU 19,1,0;0;
VDU 19,2,4;0;
VDU 19,3,4;0;
VDU 19,4,1;0;
VDU 19,5,1;0;
VDU 19,6,5;0;
VDU 19,7,5;0;
VDU 19,8,2;0;
VDU 19,9,2;0;
VDU 19,10,6;0;
VDU 19,11,6;0;
VDU 19,12,3;0;
VDU 19,13,3;0;
VDU 19,14,7;0;
VDU 19,15,7;0;
```

The resulting image will look exactly the same as a normal 8 shade of grey picture, but in fact will carry information on 16 shades. When this picture is saved to disc, all 16 colours are saved along with it. All that needs to be done when re loading the picture to screen is to redefine all 16 colours by VDU list similar to the one above, with modifications as required to give various effects or isolate particular features.

One can program keys with various combinations of re-definitions, to instantly enhance ground detail in the darker areas or concentrate on showing cloud detail in the brighter areas. There is considerable scope for playing around. Perhaps all this is old hat, but it helps to pass the time until upgrading day.

On the subject of interference, I found that I had a steady signal day and night bang on NOAA 11 frequency, which gave diagonal bands on the satellite picture. I borrowed a scanner and set off indignantly down the road to see if it was locally generated. It was! I had to turn round back to my own premises - the source was my Fax machine, which is normally left switched on continuously. My only way out so far has been to turn the Fax off whenever I wish to record NOAA 11.
Rodney Hale

I wonder if it would be possible for you to put out a question to the Remote Imaging Group magazine on my behalf. I have been trying to find out what is signified by the show of X's that appear on the Meteosat "CTH" pictures. When I say X's, they are exactly what I mean, as opposed to the lat/long markers which are obvious. I have in actual fact sent a couple of messages out asking the same question via packet radio but no one seems to know the answer. Now I am sure that there will be a reader of the magazine that will know the answer.

I would be interested to know if there were any other members of the R.I.G. that were operational on the amateur band packet network, my local network bbs is GB7NWP (or GB7CRG)

May I take this opportunity to thank you and the committee for the extremely useful service that the R.I.G. offers and of course it is said without comment that the magazine is excellent
Eddie Wilkision G4XHT.

Watch Cross Farm,
Irthington,
Carlisle CA6 4NE.

Tel: (0228) 73691

13th February 1991

Having used Timestep's PCSAT III for a few days I tried to create a .GIF file in the manner suggested in the PCSAT III manual. The result was a very elongated image when displayed by .GIF viewers such as VPIC and CSHOW. This prompted a search for another method. After a few false starts the following procedure was adopted.

Begin by using GPAL.EXE to convert any palette that you may wish to use for the finished image.

1). Use the Timestep programme FCONVERT.EXE to generate a ColoRIX file of the desired target resolution. This is choice 1 from the FCONVERT menu. If you have a palette file of the same name as your image file then tell FCONVERT to convert the palette too when it prompts you with "Include palette ? (Y/N):"

Notes: a). Choose no more than the best resolution that your display adapter can handle.

b). The resulting file will have the filename extension file.SC? where the "?" is the resolution.

c). The palette file must have the same filename as the image file but with the extension .PAL.

d). FCONVERT uses ColoRIX filenaming conventions for its resolution choices. These are as follows:

P : 640x480 16-colour
G : 800x600 16-colour
I : 320x200 256-colour
L : 640x400 256-colour
F : 640x480 256-colour
N : 800x600 256-colour

Where P, G, I, L, F and, N are the last letter of the filename extension. e.g. MYFILE.SC? the "?" will be replaced by one of the above letters.

2). Now use VPIC to display the new file. Whilst it is on-screen type "G". VPIC will respond with "Convert to GIF?". Reply with "Y" and VPIC will build you a .GIF file on disc after a longish wait....

The resulting .GIF file should be about 40% smaller than the original .DAT file for 800 * 600 * 256 resolution i.e. about 300Kb and even smaller files result if you target lower resolution .SC? files with FCONVERT. However this will depend to some extent on the number of different coloured pixels present in each image. If every adjacent pixel is of a different value then the .GIF file will be approximately the same size as the .DAT file. Since this case rarely exists, considerable savings in PC disc space should result from the above procedure.

FCONVERT is a Timestep programme that is available from Henry Neale, for those RIG members who purchased their PCSAT III systems through RIG or from Timestep Weather Systems
Yours sincerely
Peter INGRAM

MEMBERS LETTERS:

I write following the article in RIG 23 by Dr Bjorn Bjortrop "Happenings in Norway" and note how he over came his VLF receiver problem. To others constructing the time code clock microprocessor board and still pondering over a matching receiver design as an alternative to the Cirkit receiver; I recommend the following references be consulted for ideas:-

a. Receiver for the VLF time and frequency standard transmissions from station DCF77 VHF communications 2/1984.

b. self setting time code clock wireless world August 1976

c. Time by radio wireless world June 1975.

d. Circuit ideas wireless world January 1976

e. Loop aerial revived wireless world July 1979.

RIG HELPLINES:

General Enquiries & PCB Supplies
Chairman for the present

NOAA info. Henry Neale 094 585 353

Russian, Chinese satellite info/status
Les Currington 0707 326058

Schools/ Educational enquiries,
Post vacant -- offers?
European Space Agency Colin Hall Home 021 449 0006

Framestore technical support:
Mike Coombs 0530 243494
7.30pm - 9.30pm
Ian Gurton 0582 713770
7.30pm - 9.30pm
Dermot Dobson 93 Old Road,
Headington, Oxford. OX3 8SX.

RIG Dish & Feed Horn Stockists: see back of previous newsletters

Supplier problems co-ordinator, Henry Neale 0945 85353

RIG at Rallies 1990 Mike Coombs see above

RIG MICRO SPECIALISTS:

BBC Micro Position vacant, any volunteers ???

Commodore Amiga James Brown 0656 712632

Atari ST, Archimedes Peter Newman 0487 812121

IBM PC Phil Seaford 0525384419
Please call at sensible hours ie 7.30pm - 9.30pm

METDECODE VERSION 1.00

SOFTWARE RELEASE DATE APRIL 1991

AT LAST - TURN THIS SHORT WAVE RTTY TRANSMISSION:-

03022 11580 22314 10072 20041 40003 52016 69942 70281 82800 222
20063 31003 81820=

INTO THIS - IN REAL TIME -

BENBECULA [UK] DATE 24 TIME 06:00 03022 MANNED STATION
2/8 CLOUDBASE 2000/3000 FT VISIBILITY 30.0 KM
WIND DIR/SPEED 230/ 14 KTS
TEMP + 7.2 C DEWPOINT + 4.1 C PRESS 1000.3 MB RISING
WX NIL
RECENT WX SHOWER(S), VARIABLE CLOUD COVER
2/8 CUMULUS AND STRATOCUMULUS
NO MEDIUM CLOUD
NO HIGH CLOUD
1/8 CUMULUS BASE 2000 FT

EQUIPMENT NEEDED:-
IBM PC or compatible (XT,AT,etc) with serial port, mono or colour monitor, HF receiving equipment, RTTY Demodulator with RS232 level output (TTL translation circuit supplied if required), printer desirable.

BASIC VERSION: £25.00 (UPGRADE TO FULL VERSION £12.50)
Decodes MET RTTY transmissions from 5 digit groups to plain language for land and ship reports. UK land station database, automatic TBUS capture, normal RTTY receive with baud rates 45 - 110.

FULL VERSION: £35.00
All of the above plus station logging for land and ship reports, enlarged database for all land stations via Bracknell, one month satellite predictions, and orbital elements from TBUS capture file.

Sample printout - £1.00 refundable on purchase, Send 5x7 sae please.
Cheque to:- R. LEGGETT, 11 ORCHARD LANE, STEWKLEY
LEIGHTON BUZZARD BEDS. LU7 0HS.

PLEASE state disc size required, 5.25" 360K OR 3.5" 720K.
DELIVERY - normally 7/10 days to allow for cheque clearance program personalising, and post time.

REVIEW

METDECODE VERSION 1.0.

RELEASE DATE MARCH 1991

Ken Bran, G3UDC

FULL OPTIONS VERSION

This suite of programs enables an IBM PC or compatible computer with mono or colour screens, to have realtime RTTY weather report decode, from mainly the Bracknell RTTY transmissions, or any other Met RTTY transmissions, providing they are transmitted in the normal format.

Receiving equipment required, HF radio, good aerial, RTTY demodulator, with RS232 level serial out. If you have a TTL type demodulator a circuit will be included with the program notes for the translation of the levels, very easy to build, and not complicated. The program will work with a single 360k disc but all options will not be available on the same disc. 3.5 inch floppy or hard disc is much better.

The main program on start up checks which monitor is connected, identifies the program, displays your name, and initialises the system, it then automatically looks for the message headers transmitted, if that corresponds to a land station report, or a ship station report, it will advise by giving two bleeps that decode is about to take place.

As soon as the station report has been received it will decode to plain language, however, and like all normal RTTY, if the received signal is poor then the decode will be poor, and at times funny. (London with a temperature of -27C!!!!). The program identifies the station from its database (over 1000 stations!), and proceeds to translate the groups of 5 figure numbers into plain language, the main items are, cloudbase, visibility, wind direction, speed, temperature, dewpoint, pressure, current weather, past weather, and if it is a ship report, direction and speed of the ship.

Example:

03974 42480 72220 10094 20061 49963 52020 878// 333 81718 83822

87645 90710 91136=

The above decodes to:-
CLONES [EIRE] DATE 23 TIME 09:00 03974
MANNED STATION - NO SIGNIFICANT WEATHER
7/8 CLOUDBASE 1000/2000 FT VISIBILITY 30.0 KM
WIND DIR/SPEED 220/20 KTS
TEMP +9.4 C DEWPOINT + 6.1 C PRESS 996.3 MB RISING
7/8 CUMULUS AND STRATOCUMULUS
MEDIUM CLOUD UNOBSERVABLE
HIGH CLOUD UNOBSERVABLE
1/8 STRATUS BASE 1800 FT
3/8 CUMULUS BASE 2200 FT
7/8 STRATOCUMULUS BASE 4500 FT
MAX GUST 36KTS.

The program also allows you to log up to 10 land stations, and up to 10 ship stations for later examination, you can keep your eye on your holiday area for instance, or track the progress of a ship. Apart from decoding the reports, the program will intercept and store any TBUS transmission received. This is then used by another of the programs to automatically print out the Kepler elements that are transmitted, and produce a months prediction for the satellite.

The author originally wrote the TBUS program in 1983 for his Commodore system, and with the newer computers and low prices he decided (cajoled by other people) to do the IBM type. The program is user friendly, in fact all alarms (bleeps) are automatically switched off between 23:00 and 08:00 hrs !, make sure your time clock is correct.

Should you want to explore other RTTY transmissions, the program can be switched out of MET MODE to normal RTTY reception, this will give you speeds 45.45, 50, 56, 75, 100 and 110 baud with 5 bits, the program works well, and indications of receive errors are given by flashing cursor type block on the bottom line. The decode and normal rtty programs have window help screens available, all printout program operations are obvious from the screen prompts, and can be sent to screen or printer.

As at the time of writing this review, the price had not been finally fixed. It should be around £35.00 for all options, and £25.00 for the basic version (without database), look on page 95 for the advert. I have been using the review program for sometime, and have found it very absorbing. The price based on the above is very good value.

LATE NEWS PAGE

I've finished up with either 3 pages too many or 1 page short! This page will have to be for last minute News and updates. I hope that Henry has done a reasonable job for his first and probably only Newsletter Editorship, unless we have any more changes in the system. It has been a larger job than I at first thought, but never the less very enjoyable. I have possibly a team earmarked for the next one but it will all be with the committees approval. This one just had to be done as quickly as possible and there is only one way to do that -- do it yourself! It also proves that if you put your mind to doing these tasks, you actually can do them. Well I will leave the rest of the page for what it was intended to be -- LATE NEWS.

MET5 will be operational from 8-00 am GMT on 2nd of May

IS THERE ANYBODY OUT THERE?...

who would like to exchange Polar orbiter, Goes, Met, etc., images of other parts of the world, by Gif, Rix, or any other picture file format (mono or colour). I would like to build a small library of pics from all around the world, from other RIG members possessing PC based receiving systems. Any PC Format discs, 360k, 720k, 1.2M or 1.4M can be handled, and pics of the British Isles as well as Meteosat 4 images will be sent by return. Please enclose documentation on the images if possible, and your preferences as to picture formats required. There must be several members in far flung corners of the world with this equipment now, so get copying, please.

Mike Goodall, G0MGI,
2 Meadow Court, Littleport, Ely, Cambs. CB6 1JW, England.

Talk in 2 mts
4 mts
160 mts

Dunstable Downs Radio Club
Present the 8th
National Amateur Radio
CAR BOOT SALE

RSGB

FORMERLY HELD AT SHUTTLEWORTH

Sunday 19 th May
10 am until 5 pm
Car parking £1 to charity
To Be Held at

A great day out for the whole family

Floral gardens, Amusements, Various Displays, Craft Museum, Music And much more

Bargains for everyone, or have your own stall.

Computers, TV, RTTY, Transmitters, Receivers, Microwave Aerials, Components, Satellite

Over 250 stalls last year.

Stockwood Park
Farley Hill entrance, Luton Nr M1 Jun 10

Run in conjunction with Rotary Club of Luton

Cost of plots

Private £7 in advance, £9 on day
Trade £20 large plot

Send cheques made payable to
DDRC
c/o 125 Telscombe Way
Luton LU2 8QP
No Personal callers

Please enclose S.A.E. other enquiries to Wendy 0582 451057

RIG SHOP CORNER

Meteosat Downconvertor:-

a) Assembled and tested module in tin plate box:-
£147.00

b) Complete mounted in weather proof box:-
£183.00

Waterproof power and channel change connector £10.00 extra if required, but note these functions can all be done via the coaxial downlead.

RIG VHF Scanning Receiver

a) Basic receiver module, with LED Channel number display, fully assembled and tested
£128.00

b) Same module as above but with liquid crystal frequency display module replacing the LED Channel display.
£169.00

Items below available from the Chairman:

The **RIG VHF preamp** also available includes a bandpass filter and is ideal for mast-head mounting. It is available from the Chairman as a built and aligned PCB measuring 85mm by 33mm (3 5/16 x 1 15/16 inches). Module including first class post £16.00

28 page booklet entitled: Introduction to Weather Satellites & their Reception by Mike Mansfield. £2.50

Parts for **Low noise Amplifier** - see RIG 18 and item in this Newsletter Orders now being taken for next batch. £25 approx Enquiries re availability and final price etc. to the Chairman

David Juett YU3 i/f s/w for IBM PC & clones £6.50

Cheques payable to "Remote Imaging Group" please

RIG - Timestep PCSAT III

A small half sized PC card that will allow the display on IBM PC type computers of APT signals from Meteosat, GOES, NOAA and the Soviet polar Meteor and Okean satellites.

Card type	Half card 8 bit, plate through solder resisted
RFI	FCC part 15 and 1992 EMC compatible
Input	Two separate inputs, 100mV 10K ohm audio (adjustable)
Source	Live or from tape (no sync track needed)
Synchronisation	Derived from subcarrier on Meteosat, GOES and NOAA. From digital signal processing (DSP) on Meteor and Okean. No computer timing or calibrations used (or needed).
Resolution stored on disk	600 pixels 800 lines and 256 intensity levels
Zoom	To pixel resolution regardless of video card
Acquisition	Fully automatic on Meteosat and GOES (any PC). Fully automatic NOAA, Meteor and Okean live or tape (VGA, 286 and above only)
Printing	High resolution HP LaserJet (and clone) driver
Power	Supplied from host computer
Colour	64 greys or 256 colours from colour routine supplied
Contrast	Stretch or compression in linear or non linear
Display resolution	800 x 600 256 colours VGA
	640 x 480 256 or 16 colours VGA
	640 x 400 256 colours VGA (Paradise, Amstrad and Atari)
	320 x 200 256 colours VGA (display only, receive in 640x480x16 mode first)
	640 x 350 16 colours EGA (not NOAA or Soviet)
	320 x 200 4 colours CGA (not NOAA or Soviet)
	640 x 200 16 greys Amstrad 1512 (not NOAA or Soviet)
Cards supported	Any IBM register compatible card
	Tseng Labs chip set (Orchid, Sota etc)
	Paradise (Amstrad, Atari, Viglen etc)
	Video 7
	Trident (legal versions only) (Morse, ZyMOS)
Animation	Flicker free. Any section or zoom, 400 x 300 x 7 (VGA EGA)
Contents	Manual, PC card, software
Input connector	9 way D socket
Price	£137.50 (rally price) plus £3.50 postage and packing

Available from

Henry Neale
Thornlea Fishersgate Sutton St James
Spalding Lincs Tel. 0945 85353

martelec communication systems

AMIGASAT V2.0

This is a sophisticated satellite decode package with many clever and unique features, enabling Amiga owners to enjoy superb image quality equalling the best around, and providing image processingpower envied by other systems.

Features:

- *Extensive software DSP throughout the package.*
- *Images stored in full 8-bit resolution*
- *Preservation of original full-resolution image irrespective of subsequent picture processing.*
- *Zoom - fixed and user defined.*
- *Decodes new Meteosat digital header information.*

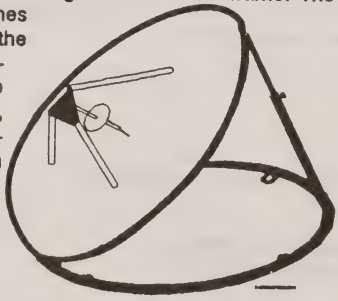
STOP PRESS - We shall be announcing and demonstrating version 2.0 at the Sandown Park Rally. If you want to see how this brilliant Amiga package just got better, come along to Sandown where Geoff Hatto will be demonstarting it. If you already have Amigasat, come along with your software disc for a free upgrade!

£129.50

Demonstration Disc £5

Meteosat Dish & Feed

The MSD20 is a precision spun aluminium parabolic dish, mounted on a rigid tubular steel frame. The 95cm dish comes complete with the MSF20 silver-plated dipole feed assembly, having an N-type, 50ohm output socket.



£135 (next day del. & ins. £18)

MSF20 Feed only £39.50 (carr.£4.25)

New fo

Volute Quadrafilar VHF Aerial

This really compact design comes fully assembled and aligned - no baluns to install, connectors to fix or rods to screw in! Comes with 50ohm BNC termination ready for fixing to your polar mount. Provides a true circular polarization over its nearly hemispherical coverage.

High Resolution Framestore

Those of you who visited Sandown Park will have seen a prototype of this advanced framestore design giving 1024 x 1024 x 256 greyscales! Featuring plug-in 1 Meg RAM modules, the Martelec Hi-res framestore can be extended to 8Meg to store well over one hour's worth of pin-sharp imagery (or a 10-frame Meteosat animation). As if all that wasn't enough, it is planned to have a printer inteface for direct connection to your printer for hard copy!

It is planned to make the framestore available both as a built and tested module, as well as a fully finished, cased unit. Full info on request.

Digisat

This comprehensive and delightful PC compatible hardware/software package has recently been upgraded to include a printer dump facility - at no extra cost! Works up to 800 x 600, providing *unlimited* animation sequencing, auto down-loading, temp readout and lots more. **Special offer £125**

Other Products

	£
MSG20 Graphstore & Grace s/ware	347.78
Omnifax New Sat decode package for PCs	195.00
Archimedes Podule & s'ware (A3000)	295.52
" (Arc 300 & 400 series)	260.00
MSK20 VHF Preamplifier	17.50
Demo Discs: Arc (2), Amiga (1)	ea. 5.00

1991....

New, Low Cost VHF Receiver Kit

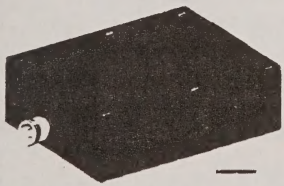
Many of you have asked us why we discontinued the popular MSR20 VHF receiver kit, and, not being able to give any very good reason, we have decided to offer a completely new design to perform to the very highest standards. As well as a kit, it will also be available as a ready-built and aligned module, and will accomodate a number of optional upgrades. Availability April/May.

Hi-Performance Downconverter

A completely new design to meet the most demanding standards. Featuring power and channel switching via the feed cable, and of course using the latest GaAsFET and MMIC technology. Production units available end May. Further details on request.

Low Noise Downconverter

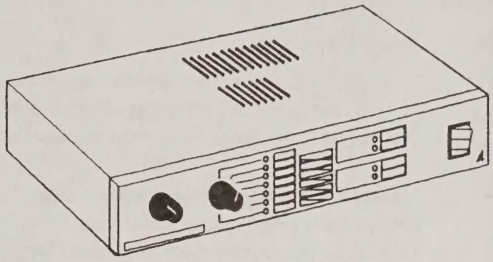
With built-in GaAsFET preamp, and housed in a weather-proof ABS box, the MSC20 is a very low noise converter (typ. 1dB). Its temperature-controlled circuitry provides both Meteosat channels on 137.5MHz. The unit comes complete with all connectors, N-type/N-type cable, and silicon sealing tape.



£150

Carriage & Ins. **£4.25**

MSR30 Synthesized Receiver



If you're looking for a professionally- built synthesized receiver, with performance to match, then the MSR30 has to be the one. No corners have been cut to achieve the best possible performance, and a host of features including:

- *Built-in Scanner with intelligent halt (2.4KHz detector)*
- *Auto tape record facility, with adjustable noise dropout delay*
- *Auotomatic frequency control*
- *Adjustable APT output level*
- *Separate internal PSU for downconverter*
- *Tailored APT passband filtering.*

£295

Carriage & Ins. **£7.50**

Components & Miscellaneous

		£ ea.
SL6601C	FM IF	0.80
BF981	Low noise MOSFET	0.42
NE32084	GaAsFET (improved 32083)	7.50
Xtals	(All common sat freq.)	3.50
NE567	Tone decoder	0.65
MSA-0835	Low noise MMIC	6.85
ATF10135	GaAsFET	9.80
ATF10136	GaAsFET	9.80
TL071	Low noise Op Amp	0.30
TL072	Dual TL071	0.35
TL074	Quad TL071	0.40
LM324	General purpose Quad Op Amp	0.25
SFA10.7	Ceramic Filter	0.85
FX1115	Ferrite Bead	0.08

Send S.A.E. for full list of ICs, FETs, Coils, Filters, Xtals, connectors

Ordering Information: Prices exclude VAT, add 15% to total for U.K. orders. Where not indicated, carriage should be added at £1.50. For more than one item the maximum carriage is £7.50 (£18 if MSD20 included). Overseas rates are payable at cost. Payment may be made by cheque, postal order payable to ***Martelec Ltd.. Visa*** and ***Access*** cards accepted.

8 Kimber's Lane, Farnham, Surrey. GU9 9PT, U.K.

Tel./Fax 0252 737620 Mobile 0836 297252

PROLOGUE COMPUTERS LTD

2 ORCHARD RISE, OLVESTON, BRISTOL
BS12 3DY. TEL. 0454 612882/325430

□ *COMPUTERS*

Professional quality systems at discount prices. Ideally suited for use with the RIG - Timestep PCSAT III Interface/Software, at display resolutions up to 1024 x 768 Pixels (With Super VGA monitor option).

286 12MHz. 1Mb RAM (expandable to 4Mb). Teac 1.2 or 1.44Mb Floppy drive.
Small footprint high quality metal case, 200W PSU. 3 Free Expansion slots.
14" VGA Mono monitor (640*480 pixels / 64 grey levels) Paradise 512kb VGA card.
AMI BIOS £532.00

386 SX -16MHz. 1Mb RAM (expandable to 8Mb). Teac 1.2 or 1.44Mb floppy drive.
Small footprint high quality metal case, 200W PSU. 3 Free expansion slots.
14" VGA Mono monitor (640*480 pixels / 64 grey levels) Paradise 512kb VGA card.
AMI BIOS. £720.00

386 -25MHz. 1Mb RAM (expandable to 8Mb). Teac 1.2 or 1.44Mb floppy drive.
Small footprint or full AT case, 200W PSU. 3/5 Free expansion slots.
14" VGA Mono monitor (640*480 pixels / 64 grey levels) Paradise 512kb VGA card.
(As used by RIG) £976.00

□ *OPTIONS:*

VGA Colour monitor 14" (640 x 480).....ADD £141
Super VGA Colour Monitor 14" (1024 x 768) ADD £174
1Mb Video Card (Tseng Labs - 1024 x 768 x 256 colours) ADD £35
Mini Tower Case (Leaves 5 free expansion slots) ADD £10
4Mb RAM (instead of 1Mb)..... ADD £130
42Mb 28ms Seagate hard disk ..... ADD £140
Mouse (serial or bus interface).....ADD £23
MS DOS V3.3.....ADD £49

□ *COMPONENTS:*

MOTHERBOARDS : XT-12 £56, 286-12 £96, 386SX-16 £253, 385-25 £429
VGA CARDS : Paradise 256kb (640x480x16 colours, upgradable to 512kb) £72.80
Paradise 512kb (640x480x256 colour etc.) £91.00
Tseng Labs 1Mb (1024x768x256 colours, etc) £118.75
MONITORS : 14" VGA Mono £85, 14" VGA colour £237
14" Super VGA colour £249, 14" Multiscan Colour £298
FLOPPY DRIVES : TEAC 360/720Kb £50, 1.2/1.44Mb £53
HARD DISKS : SEAGATE ST251-1 40mb 28ms £175, ST157A IDE 42Mb 28ms £157

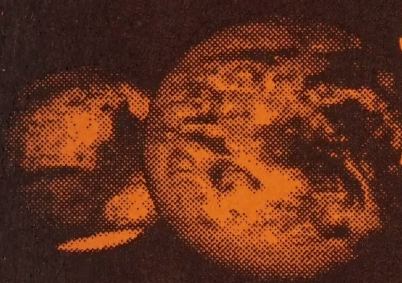
Please call for further information on systems and components (Day/Evening)
All prices EXCLUDE VAT. Delivery - 5 Days (Components), 10 Days (Computers).

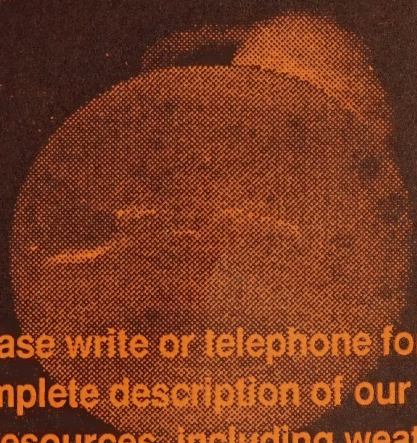
Tel: 0305 822753
Fax: 0305 860483

Earth from Space?

or

Space from Earth?





BRITISH EDUCATION AND TRAINING TECHNOLOGY BETT 90

GOLD AWARD:
SPACETECH
WEATHER SATELLITE STATION.

Please write or telephone for a complete description of our range of resources, including weather satellite equipment and space-science books posters videos etc.

BRITISH EDUCATION AND TRAINING TECHNOLOGY BETT 91

HIGHLY RECOMMENDED:
SPACETECH
ORRERY

DEMONSTRATION DISCS AVAILABLE

spacetech
Space Science Resources

21 West Wools, Portland, Dorset. DT5 2EA

What do I need for APT ?

As well as complete systems, Timestep allow you to buy all the parts separately. The quickest and least painful approach is simply to buy a complete system. Take your time and take advantage of our RIG special prices (UK only), you will save some money ! The parts you will need assuming you are using the IBM type PC approach are :-

Meteosat Meteosat is probably the best place to start. It sends images constantly. You could buy one of our ready to go systems, or you can buy the parts separately. Remember you do not need a NOAA receiver if you use our Meteosat Receiver. This will free your NOAA system to look for the Soviet polar orbiters, something every satellite enthusiast should be doing ! The Yagi is fine for most users, for critical applications the Dish is recommended.

Timestep products (world prices)	Britain	Europe	USA	RIG UK Members
1.0M dish antenna and feed horn	£199.00	N/A	N/A	£149.95
Yagi antenna	£124.95	£135.00	$149.00	£99.95
Meteosat pre-amplifier	£92.00	£110.00	$149.00	£84.95
20M cable	£ 16.00	£21.00	$33.50	£14.00
Meteosat receiver	£199.00	£225.00	$399.00	£169.95
PCSAT III interface card	£199.00	£225.00	$299.00	Henry Neale
PCSAT III connecting cable	£ 9.95	£ 9.95	$15.00	£ 6.49
Dish feed (coffee can type)	£29.95	£38.50	$49.00	£24.95

POLAR You have the choice of 2 receivers. Both have superior resistance to interference (money and postage back guarantee). The 2 channel unit covers both NOAA's on 137.50Mhz and 137.62Mhz. The scanning receiver covers all known satellites including the complete Soviet series. NOAA receivers may be simply plugged into the PCSAT III, or NOAA and Meteosat can be selected by using the switch box.

Crossed dipole antenna	£39.95	£55.00	$64.00	£29.95
NOAA pre-amplifier	£24.95	£31.50	$49.00	£19.95
50M cable	£24.95	£31.50	$68.00	£21.95
2 channel receiver	£149.95	£169.00	$199.00	£124.95
PROscan receiver	£299.00	£325.00	$499.00	£249.95
PCSAT III interface (as above)	£199.00	£225.00	$299.00	Henry Neale
PCSAT III selector switch box	£24.95	£24.95	$35.00	£19.95
Instant Track PC prediction	£24.95	£24.95	N/A	£19.95

Computers A 286 AT with SVGA is by far the best choice. Have a look around, decide what configuration you want, then call us. We will give you the very best price and guarantee full compatibility with our equipment (UK only).

HRPT The only UK system approved by the designer John DuBois. Available from late April 1991. Complete systems, or separate parts for experimenters.

All prices include VAT at 17.5% and carriage in Britain, and Air carriage to other destinations.

Timestep
Wickhambrook Newmarket CB8 8QA England
Tel. 0440 820040 Fax. 0440 820281